United States
Department of
Agriculture

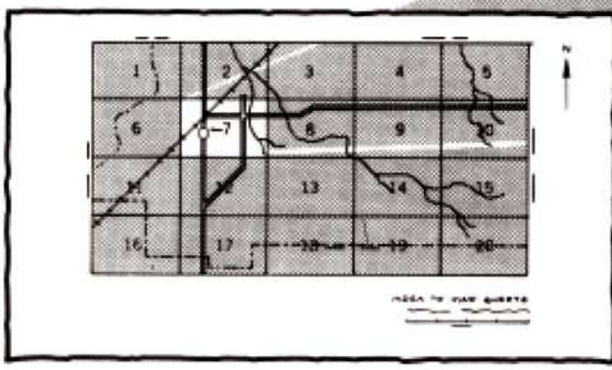
Soil
Conservation
Service

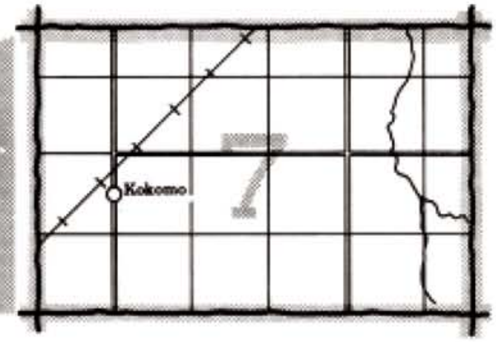
In cooperation with
Illinois Agricultural
Experiment Station

Soil Survey of Perry County, Illinois

HOW TO USE

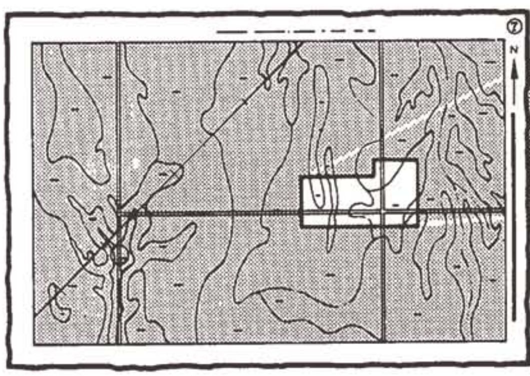
1. Locate your area of interest on the "Index to Map Sheets"

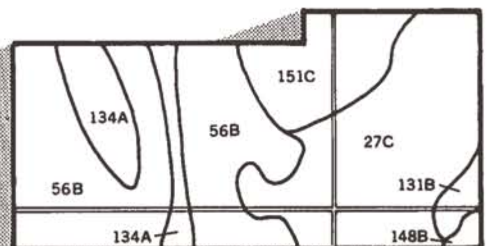




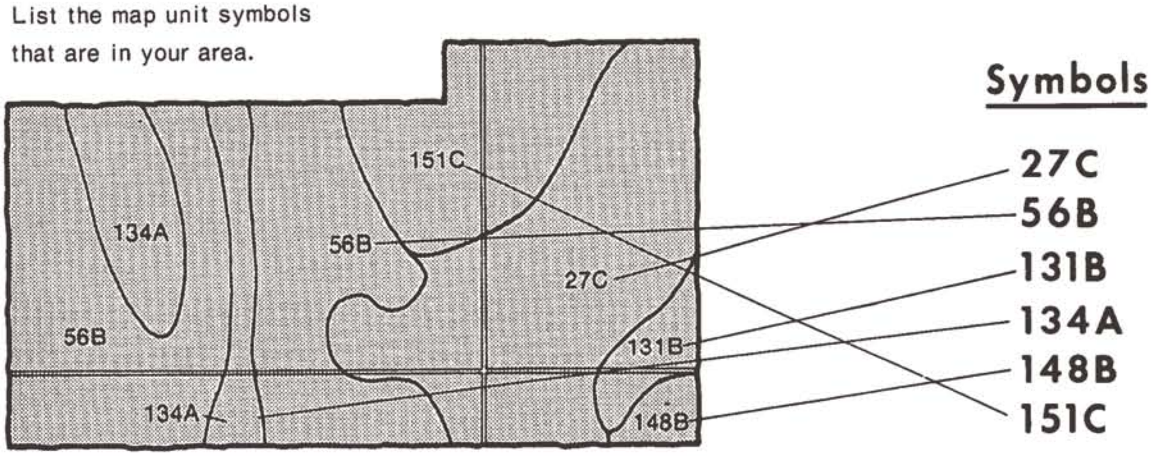
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



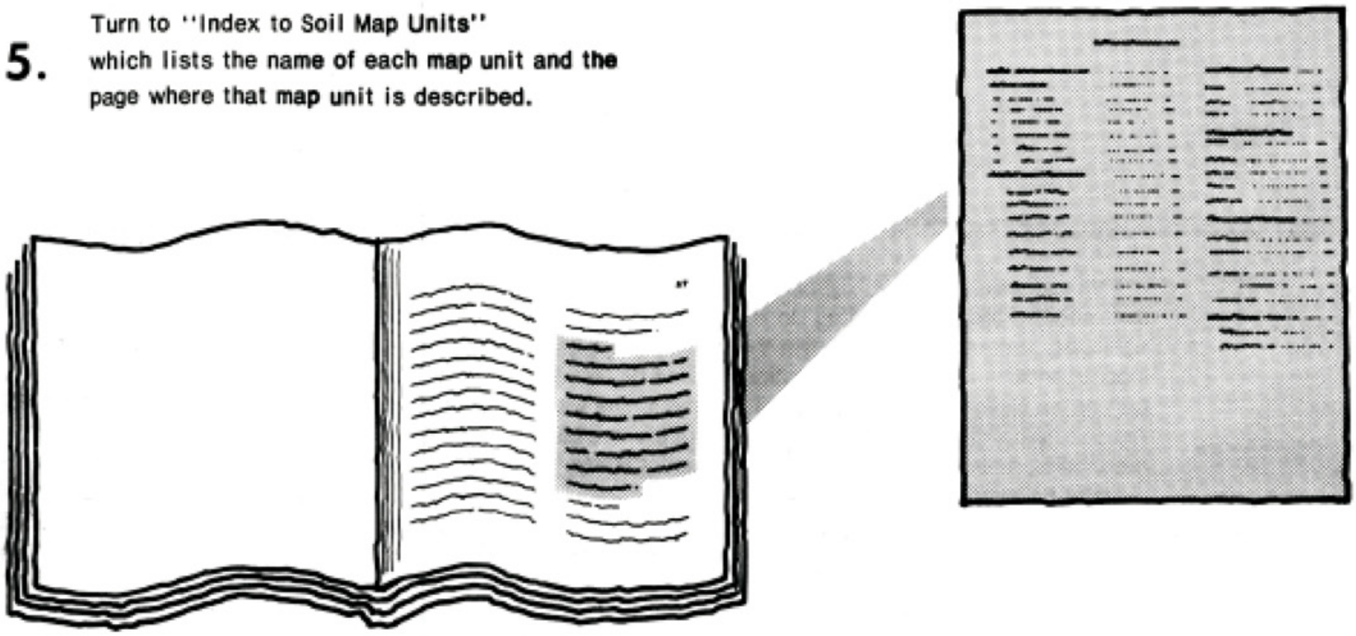


4. List the map unit symbols that are in your area.

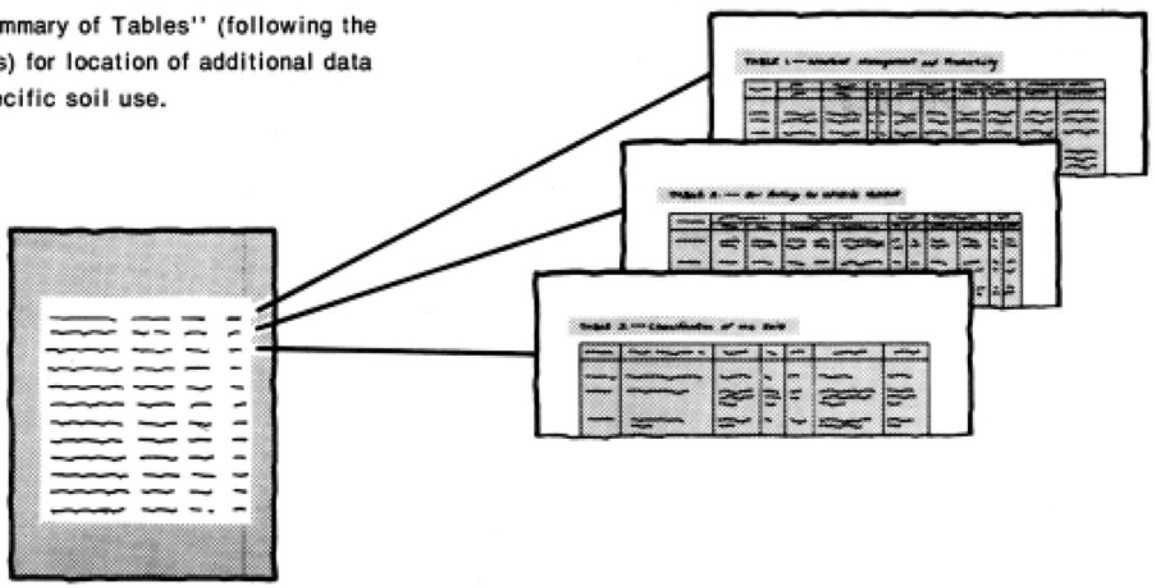


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in September 1983. Soil names and descriptions were approved in May 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Perry County Soil and Water Conservation District. Financial assistance was provided by the Perry County Board.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This soil survey is Illinois Agricultural Experiment Station Soil Report No. 125.

Cover: An area of Lenzburg soils developed for recreational uses and wildlife habitat in Pyramid State Park.

Contents

Soil Series

Issued September 1988

Index to Map Units

Summary of Tables

Foreword

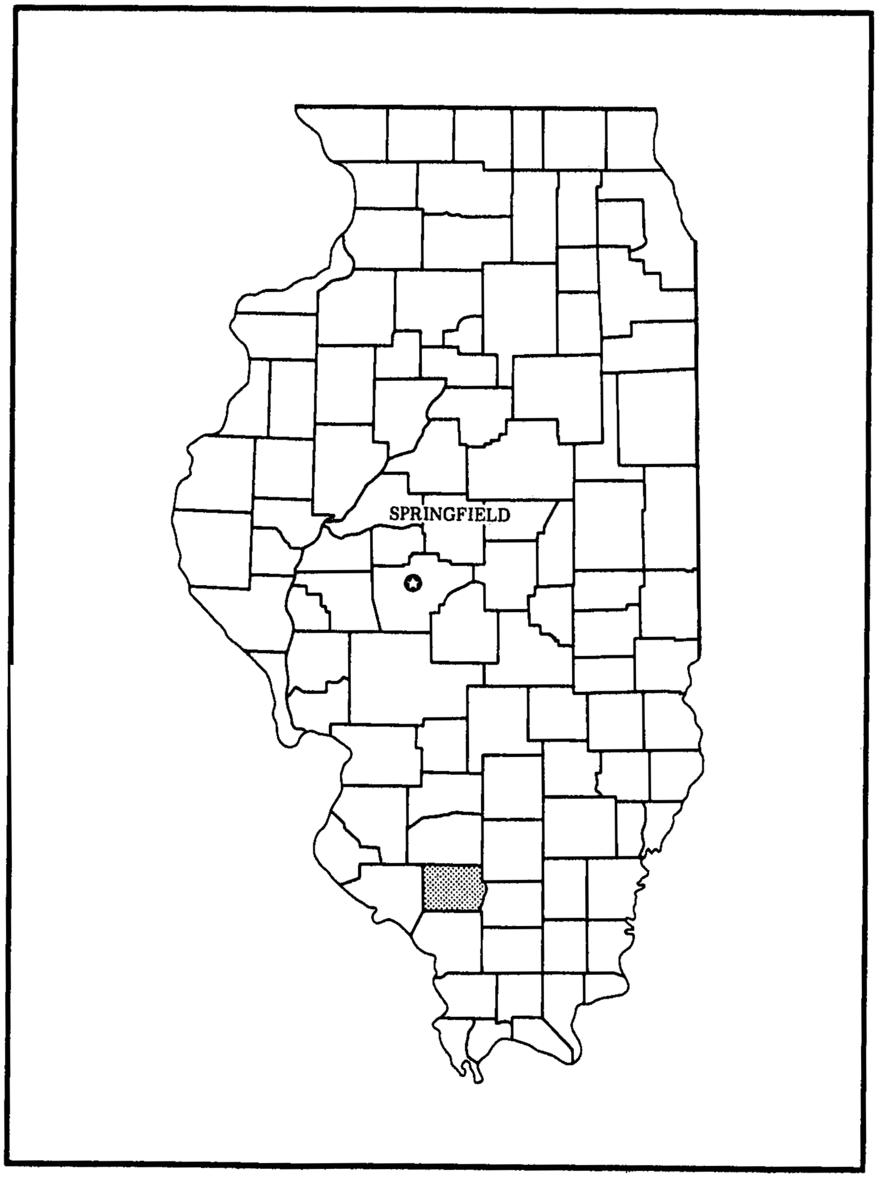
This soil survey contains information that can be used in land-planning programs in Perry County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

John J. Eckes
State Conservationist
Soil Conservation Service



Location of Perry County in Illinois.

Soil Survey of Perry County, Illinois

By Dana R. Grantham and Sam J. Indorante, Soil Conservation Service

Fieldwork by D.R. Grantham and S.J. Indorante, Soil Conservation Service, and N.E. Story, Perry County

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Illinois Agricultural Experiment Station

PERRY COUNTY is in the southern part of Illinois. It has an area of 283,520 acres, or 443 square miles. In 1979, it had a population of 21,000 (*14*). Pinckneyville is the county seat.

General Nature of the County

The following paragraphs provide general information about the county. They describe climate, history and development, physiography and drainage, and transportation facilities.

Climate

Prepared by the Illinois State Water Survey Division, Champaign, Illinois.

Perry County has a continental climate. Summers are hot, and winters are cold.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Carbondale in the period 1951 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In January the average temperature is 31.6 degrees F, and the average daily minimum temperature is 22.0 degrees. The lowest temperature on record, which occurred at DuQuoin on February 2, 1951, is -11 degrees. In summer the average temperature is 76.3 degrees, and the average monthly maximum temperature is 88.3 degrees. The highest recorded temperature, which occurred at DuQuoin on July 18, 1954, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 42.49 inches. Of this, 23.16 inches, or about 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18.25 inches. The heaviest 1-day rainfall during the period of record was 5.77 inches at Carbondale on May 22, 1957. Thunderstorms occur on about 53 days each year.

The average seasonal snowfall is 13.6 inches. The greatest snow depth at any one time during the period of record was 14 inches. On the average, 6 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

History and Development

The area that is now Perry County at one time was part of the territory claimed by the Kaskaskia Indians. At that time much of the survey area was wooded, although scattered prairie lands were throughout the area.

Settlement of the survey area began around 1799 (*3*). Most of the early settlers came from the Carolinas, Tennessee, and Kentucky. On January 29, 1827, Perry County was established by an act of the Fifth General

Assembly of Illinois, and in December 1827, Pinckneyville was made the county seat.

The construction of the Illinois Central Railroad in 1854 helped to establish the towns of DuQuoin, St. Johns, and Tamaroa. In 1853, Illinois Central contracted to sink a coal shaft in the St. Johns area (*4*). The mine was purchased by the firm of Halliday Brothers in 1867. Another coal shaft was sunk in 1869. By 1873, the mine became the largest in Perry County. The coal industry has continued to expand. In 1980, almost 11 million tons of coal was mined from the five active surface mines in the county (*9*). The county had an estimated 650,138,000 tons of strippable coal reserves in 1975 (*16*).

About 60 percent of the county is used for farming (*14*). The principal grain crops are soybeans, corn, and wheat. Hay is grown on about 12,000 acres (*10*).

The county has four incorporated towns. DuQuoin and Pinckneyville are the largest towns. They have populations of 7,500 and 3,600, respectively.

Physiography and Drainage

Perry County is in the Mt. Vernon Hill Country region (*13*). This loess-covered till plain is dissected by shallow rivers and creeks. The till occurs as a thin layer deposited mainly during the Illinoian Glaciation. The natural drainage is southward. The Little Muddy River, Beaucoup, Galum, and Swanwick Creeks, and the tributaries of these streams drain most of the county.

Transportation Facilities

The transportation facilities in Perry County include a federal highway, state highways, county and township roads, railroads, and a small airport. Federal Highway 51 runs north-south through the eastern part of the county. State Highways 13, 127, 150, 152, and 154 cross the county. Most county and township roads are blacktopped or graveled. Two major rail lines provide freight service. A small airport is located south of Pinckneyville, along State Highways 13 and 127.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example,

data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

The soil boundaries in some areas are projections of soil lines from adjacent areas because of the refusal of landowners to allow soil scientists access for soil survey purposes. The reliability of the mapping is reduced in these areas. The location and approximate acreage of these areas are as follows: 120 acres on atlas sheet 2, the north half and southeast quarter of the southwest quarter of sec. 2, T. 4 S., R. 4 W.; 80 acres on atlas sheet 3 and 40 acres on atlas sheet 4, the south half of the southwest quarter of sec. 2 and the northwest quarter of the northeast quarter of sec. 11, T. 4 S., R. 3 W.; and 95 acres on atlas sheet 18, the south half of the southwest quarter and the west half of the northeast quarter of the southwest quarter of sec. 32, T. 4 S., R. 2 W.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map of Perry County joins the published general soil maps of Jackson and Randolph Counties. The names of the soil associations may differ slightly because of differences in the extent of the named soils in each county. Though the names vary slightly, the associations represent similar landscape units that have similar soil properties and similar management requirements.

Soil Descriptions

Nearly Level and Gently Sloping, Poorly Drained to Moderately Well Drained Soils That are Subject to Flooding; on Flood Plains and Terraces

These soils are on nearly level flood plains and the slightly higher terraces. They generally are well suited to cultivated crops, hay, and pasture. They generally are unsuited to dwellings, septic tank absorption fields, and local roads and streets because of a seasonal high water table and the flooding.

1. Bonnie-Belknap Association

Nearly level, poorly drained and somewhat poorly drained soils formed in silty alluvium; on flood plains

This association generally consists of soils in long, narrow areas along perennial and intermittent streams. Scattered shallow depressions and low ridges are throughout the association. Slopes range from 0 to 2 percent.

This association makes up about 12 percent of the county. It is about 55 percent Bonnie soils, 40 percent Belknap soils, and 5 percent minor soils.

Bonnie soils are poorly drained and are in broad, slight depressions adjacent to the uplands. Typically, the surface layer is grayish brown, friable silt loam about 6 inches thick. The substratum is mottled and friable. The upper part is light brownish gray and grayish brown silt loam. The next part is light brownish gray silt loam. The lower part to a depth of 60 inches or more is light brownish gray silty clay loam.

Belknap soils are somewhat poorly drained and are adjacent to and roughly parallel to perennial streams. Typically, the surface layer is brown, mottled silt loam about 9 inches thick. The substratum to a depth of 60 inches or more is friable silt loam. The upper part is grayish brown and brown and is mottled, and the lower part is brown and mottled.

Minor in this association are the somewhat poorly drained Banlic soils on low terraces and the poorly drained, clayey Karnak soils in depressions below the major soils.

In most areas the major soils are used for cultivated crops. A few areas are used for hay and pasture or for woodland. The major soils are well suited to corn, soybeans, hay, pasture, and woodland. They generally are unsuited to small grain, dwellings, septic tank absorption fields, and local roads and streets. Frequent flooding and a seasonal high water table are the major management concerns.

2. Hurst-Okaw-Colp Association

Nearly level and gently sloping, moderately well drained to poorly drained soils formed in loess and in the underlying clayey or silty lacustrine sediments; on terraces

This association consists mainly of soils on low, broad ridges and on terrace breaks. It is generally in irregularly shaped areas adjacent to the lower flood plains along perennial streams. Gently sloping areas are common along small drainageways and adjacent to the flood plains. Slopes range from 0 to 7 percent.

This association makes up about 2 percent of the county. It is about 28 percent Hurst soils, 18 percent

Okaw soils, 17 percent Colp soils, and 37 percent minor soils (fig. 1).

Hurst soils are nearly level and are somewhat poorly drained. They are slightly higher on the landscape than the Okaw soils. Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is light gray, mottled, friable silt loam about 7 inches thick. The subsoil is about 34 inches thick. The upper part is brown, mottled, firm silty clay; the next part is grayish brown and yellowish brown, firm silty clay; and the lower part is light olive gray, firm silty clay loam. The substratum to a depth of 60 inches or more is grayish brown, mottled, firm silty clay.

Okaw soils are nearly level and are poorly drained. They are on relatively broad flats on the stream terraces. Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 4 inches thick. The subsoil is grayish brown, mottled, firm silty clay about 42 inches thick. The substratum to a depth of 60 inches or more also is grayish brown, mottled, firm silty clay.

Colp soils are gently sloping and are moderately well drained. They are on the slightly higher ridges and on short terrace breaks. Typically, the surface layer is dark grayish brown and dark yellowish brown, friable silt loam about 6 inches thick. The subsoil extends below a depth of 60 inches. It is mottled and firm. The upper part is yellowish brown, silty clay loam, the next part is light brownish gray silty clay loam, and the lower part is grayish brown silty clay.

Minor in this association are the somewhat poorly drained Belknap and poorly drained Bonnie and Karnak soils on flood plains.

In most areas the major soils are used for cultivated crops. A few areas are used for hay and pasture or for woodland. The major soils are moderately suited to corn, soybeans, small grain, hay, pasture, and woodland. They

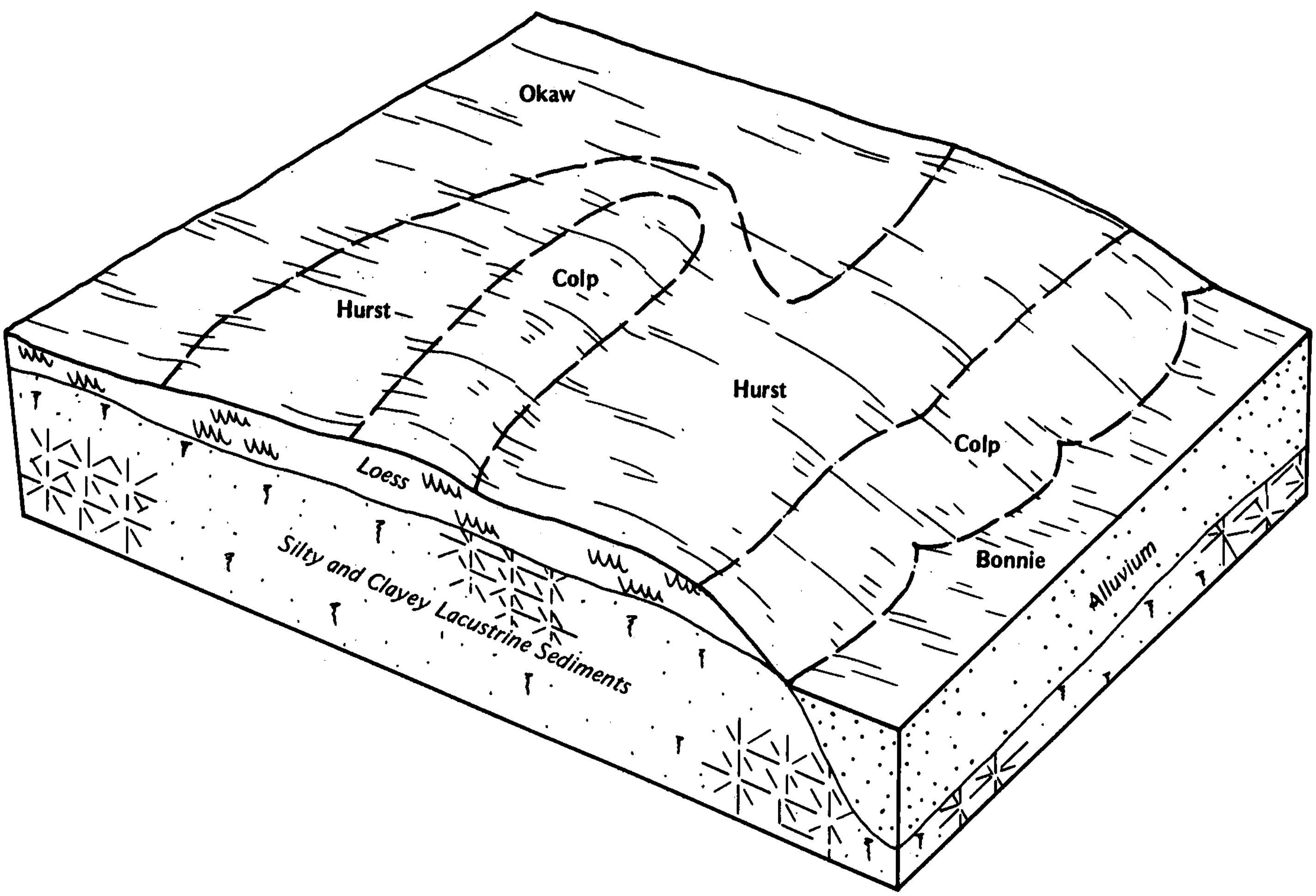


Figure 1.—Typical pattern of soils and parent material in the Hurst-Okaw-Colp association.

generally are unsuited to dwellings, septic tank absorption fields, and local roads and streets. Rare flooding and a seasonal high water table are the major management concerns.

Nearly Level to Sloping, Moderately Well Drained to Poorly Drained Soils; on Uplands

These soils are on broad flats and at the head of drainageways. They are generally suited to cultivated crops, hay, pasture, and woodland. They are poorly suited to dwellings, septic tank absorption fields, and local roads and streets. A seasonal high water table, slow or very slow permeability, and the hazard of erosion are the major management concerns.

3. Stoy-Hosmer Association

Nearly level to sloping, somewhat poorly drained and moderately well drained soils formed in loess; on uplands

This association consists mainly of soils on broad upland flats, low hills, and narrow ridges between drainageways. Scattered areas of more sloping soils are along drainageways throughout the association. Slopês range from 0 to 10 percent.

This association makes up about 11 percent of the county. It is about 58 percent Stoy soils, 23 percent Hosmer soils, and 19 percent minor soils (fig. 2).

Stoy soils are nearly level and gently sloping and are somewhat poorly drained. They are generally on broad flats, on low knolls and ridges, and along the upper end of drainageways. Typically, the surface layer is brown silt loam about 5 inches thick. The subsurface layer is yellowish brown, mottled, friable silt loam about 7 inches thick. The subsoil extends below a depth of 60 inches. It is mottled. The upper part is yellowish brown, friable silt loam. The next part is yellowish brown, pale brown, brown, and grayish brown, firm silty clay loam. The lower part is light brownish gray and yellowish brown, firm, slightly brittle silty clay loam and silt loam.

Hosmer soils are gently sloping and sloping and are moderately well drained. They are generally on the higher knolls, on the narrower ridges, and on slopes along drainageways. Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil extends below a depth of 60 inches. It is mottled. In sequence downward, it is yellowish brown, friable silty clay loam; yellowish brown,

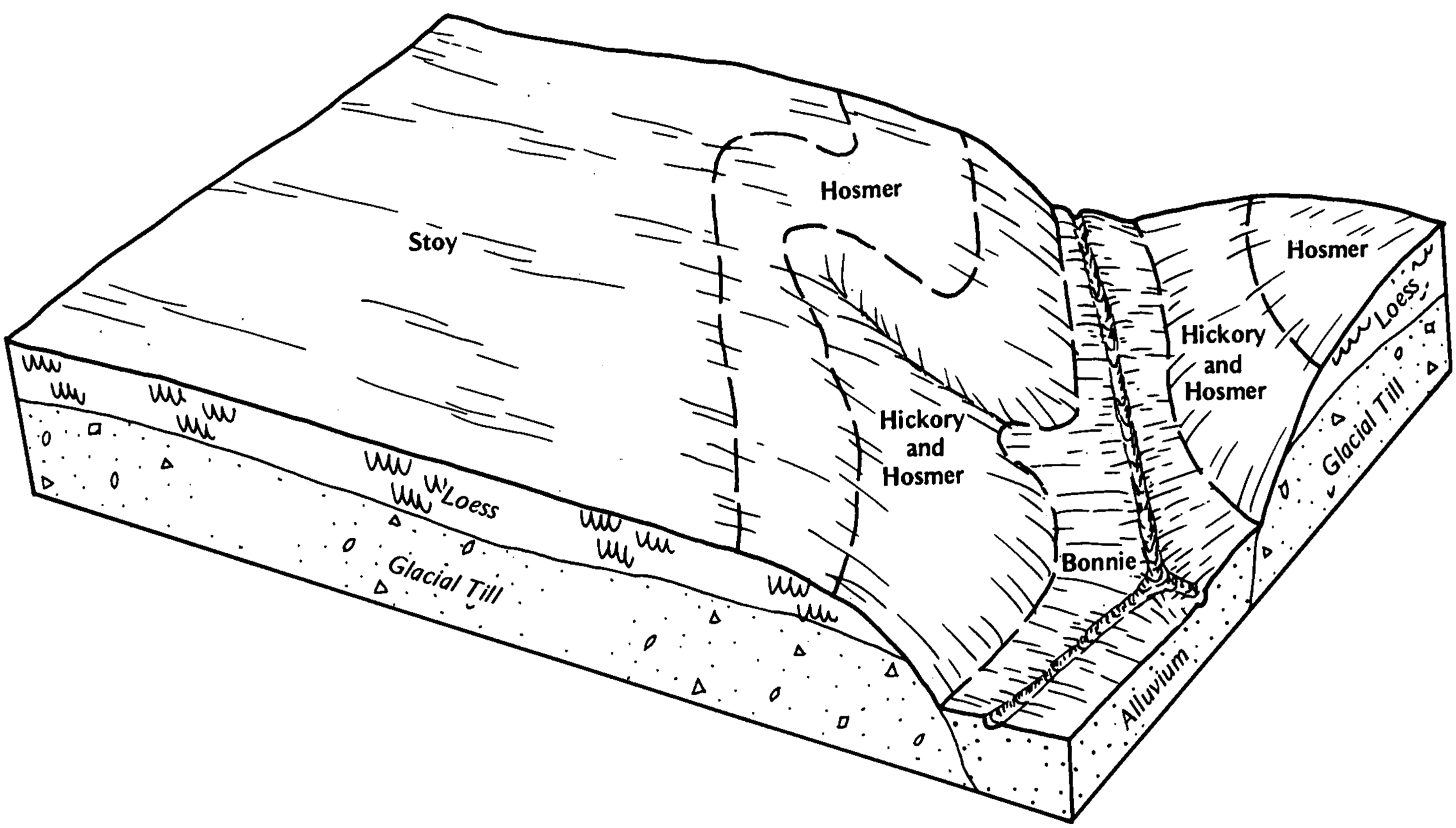


Figure 2.—Typical pattern of soils and parent material in the Stoy-Hosmer association.

friable silty clay loam that has many light gray silt coatings; yellowish brown, friable silty clay loam; light brownish gray and yellowish brown, firm, slightly brittle silty clay loam; and yellowish brown and light brownish gray, friable silt loam.

Minor in this association are the somewhat poorly drained Blair soils in the more sloping areas along drainageways, the poorly drained Weir soils on upland flats and in depressions, the poorly drained Bonnie soils on narrow flood plains, and Hickory soils on side slopes below the Hosmer soils.

In most areas the major soils are used for cultivated crops or for hay and pasture. A few areas are used as woodland. The major soils are generally well suited or moderately suited to corn, soybeans, small grain, hay, pasture, and woodland. They generally are poorly suited or moderately suited to dwellings and are poorly suited to septic tank absorption fields and to local roads and streets. A seasonal high water table, slow or very slow permeability, the shrink-swell potential, and the hazard of erosion are the major management concerns.

4. Bluford-Wynoose-Ava Association

Nearly level to sloping moderately well drained to poorly drained soils formed in loess and in the underlying silty sediments; on uplands

This association consists mainly of soils on broad divides and narrow ridges between drainageways. Scattered shallow depressions and sloping areas along drainageways are throughout the association. Slopes range from 0 to 10 percent.

This association makes up about 11 percent of the county. It is about 62 percent Bluford soils, 18 percent Wynoose soils, 14 percent Ava soils, and 6 percent minor soils (fig. 3).

Bluford soils are nearly level and gently sloping and are somewhat poorly drained. They are generally on broad upland divides, on low knolls and ridges, and along the upper end of drainageways. Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsurface layer is yellowish brown, mottled, friable silt loam about 6 inches thick. The subsoil to a depth of more than 60 inches is silty clay loam. The upper part is grayish brown, mottled, and firm and friable. The next part is yellowish brown and light brownish gray,

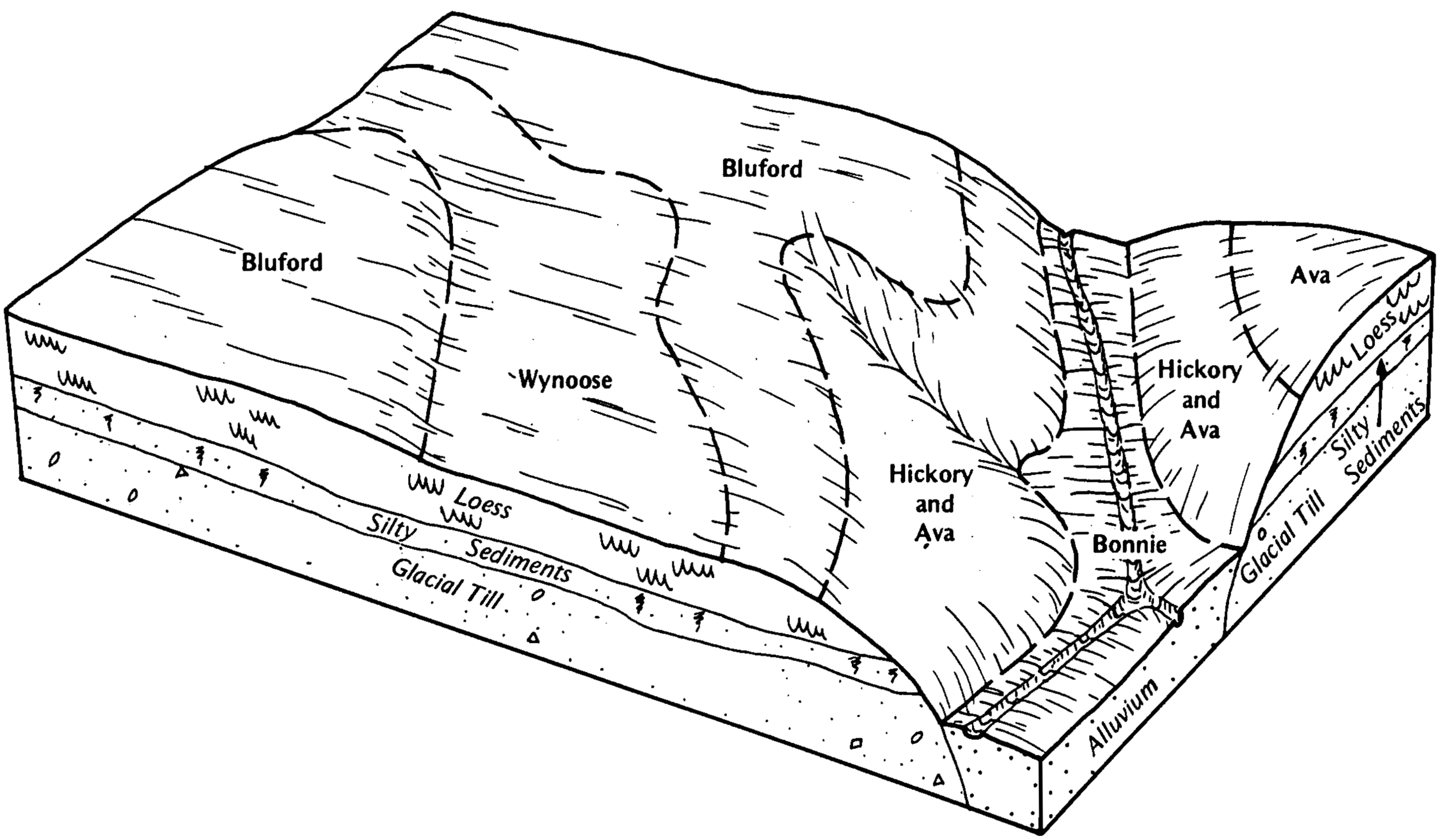


Figure 3.—Typical pattern of soils and parent material in the Bluford-Wynoose-Ava association.

mottled, firm, and slightly brittle. The lower part is dark yellowish brown, mottled, and friable.

Wynoose soils are nearly level and depressional and are poorly drained. They are generally on broad upland flats and in slight depressions. Typically, the surface layer is grayish brown, friable silt loam about 7 inches thick. The subsurface layer is grayish brown and light gray, friable silt loam about 9 inches thick. The subsoil extends below a depth of 60 inches. It is light brownish gray and has yellowish red and yellowish brown mottles. The upper part is firm silty clay, and the lower part is firm and friable silty clay loam.

Ava soils are gently sloping and sloping and are moderately well drained. They are generally on the higher knolls, the narrower ridges, and the steeper slopes along drainageways. Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 8 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, mottled, friable silt loam. The next part is brown and pale brown, mottled, firm silty clay loam. The lower part is grayish brown, mottled, firm, slightly brittle silt loam.

Minor in this association are the somewhat poorly drained Blair soils in the more sloping areas along the upper end of drainageways, the poorly drained Bonnie soils on narrow flood plains, and Hickory soils on side slopes below the Ava soils.

In most areas the major soils are used for cultivated crops. A few areas are used for hay and pasture or for woodland. The major soils generally are well suited or moderately suited to corn, soybeans, small grain, hay, pasture, and woodland. They generally are poorly suited to dwellings, septic tanks absorption fields, and local roads and streets. A seasonal high water table, slow or very slow permeability, and the hazard of erosion are the major management concerns.

5. Hoyleton-Cisne Association

Nearly level and gently sloping, somewhat poorly drained and poorly drained soils formed in loess and in the underlying silty sediments; on uplands

This association consists mainly of soils on broad upland flats, on low knolls and ridges, and along the upper end of drainageways. Scattered shallow depressions, sloping areas along drainageways, and areas affected by a high content of sodium are throughout the association. Slopes range from 0 to 6 percent.

This association makes up about 17 percent of the county. It is about 44 percent Hoyleton soils, 37 percent Cisne soils, and 19 percent minor soils (fig. 4).

Hoyleton soils are nearly level and gently sloping and are somewhat poorly drained. They are generally on broad divides, on low knolls and ridges, and along the upper end of drainageways. Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is brown and yellowish brown, mottled, friable silt loam about 3 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, mottled, friable and firm silty clay loam. The next part is pale brown and light brownish gray, mottled, firm and friable silty clay loam. The lower part is light brownish gray, grayish brown, yellowish brown, and dark yellowish brown, friable silt loam.

Cisne soils are nearly level or depressional and are poorly drained. They generally are on broad flats and in slight depressions. Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is mottled, friable silt loam about 12 inches thick. The upper part is grayish brown, and the lower part is light brownish gray. The subsoil extends below a depth of 60 inches. It is mottled. The upper part is grayish brown and light brownish gray, firm silty clay; the next part is grayish brown, firm silty clay loam; and the lower part is light brownish gray, friable silt loam.

Minor in this association are the somewhat poorly drained Blair and Darmstadt soils, the poorly drained Huey soils, and the moderately well drained Richview and Tamalco soils. Blair soils are on side slopes at the head of drainageways. Darmstadt and Huey soils have a high content of sodium in the subsoil. They are intermingled with areas of the Hoyleton and Cisne soils. Richview soils are on prominent knolls and ridges. The gently sloping Tamalco soils are on low knolls. They have a high content of sodium in the subsoil.

In most areas the major soils are used for cultivated crops or for hay and pasture. They generally are well suited or moderately suited to corn, soybeans, small grain, hay, and pasture. They generally are poorly suited to dwellings, septic tank absorption fields, and local roads and streets. A seasonal high water table, slow or very slow permeability, and the hazard of erosion are the major management concerns.

6. Oconee-Cisne-Darmstadt Association

Nearly level and gently sloping, somewhat poorly drained and poorly drained soils formed in loess or in loess and the underlying silty sediments; on uplands

This association consists of soils on broad upland flats. Scattered shallow depressions, gently sloping areas along drainageways, and a few knolls and mounds are throughout the association. Slopes range from 0 to 6 percent.

This association makes up about 4 percent of the county. It is about 34 percent Oconee soils, 30 percent Cisne soils, 18 percent Darmstadt soils, and 18 percent minor soils.

Oconee soils are nearly level and are somewhat poorly drained. They formed in loess more than 60 inches thick. They are generally on broad flats. They are mapped as separate areas or as areas intermingled with

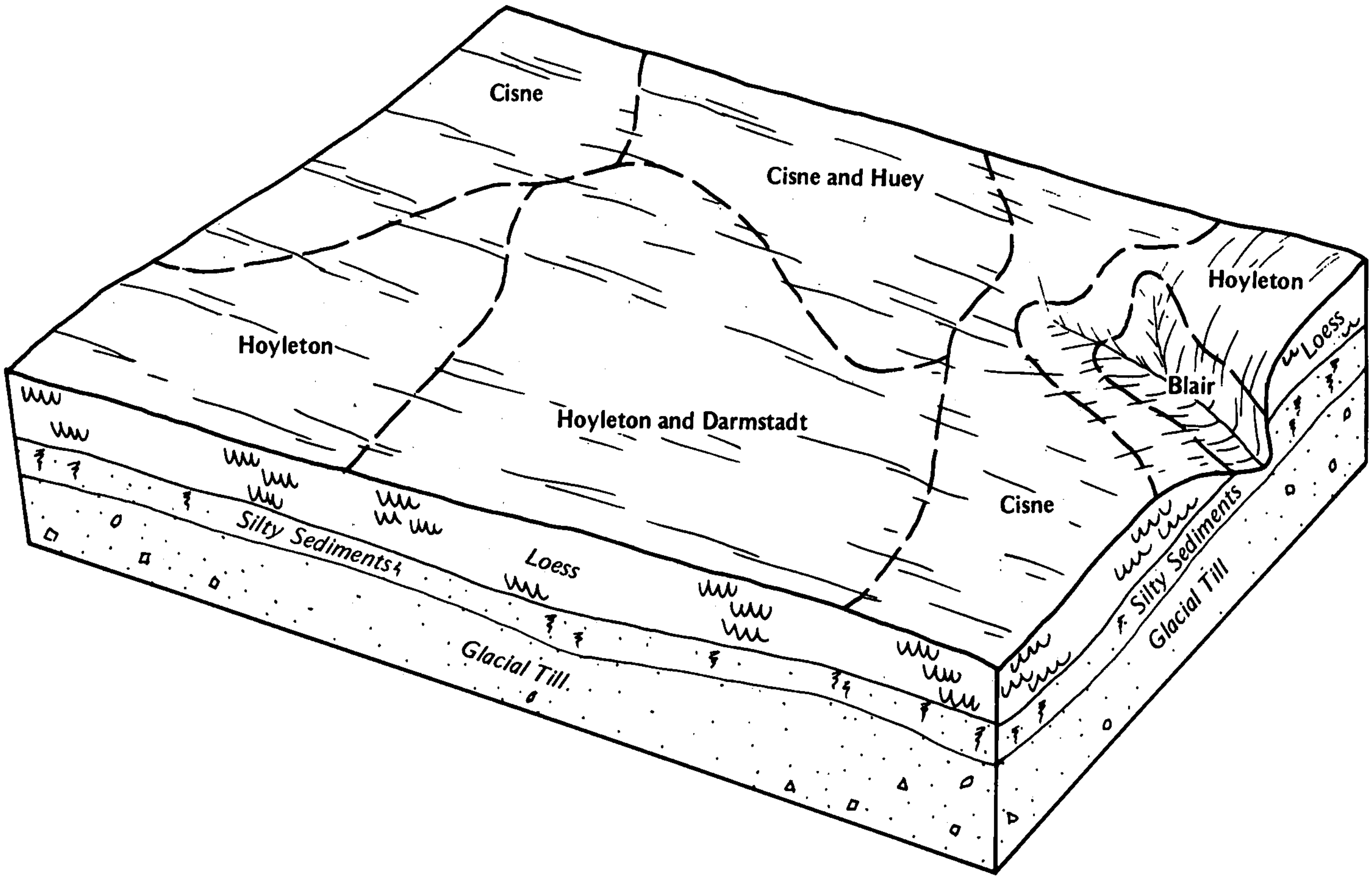


Figure 4.—Typical pattern of soils and parent material in the Hoyleton-Cisne association.

areas of the Darmstadt soils. Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown and pale brown, mottled, friable silt loam about 7 inches thick. The subsoil is about 37 inches thick. It is mottled. The upper part is brown, firm silty clay loam and silty clay. The next part is light brownish gray and grayish brown, firm silty clay loam. The lower part is grayish brown, friable silt loam. The substratum to a depth of 60 inches or more also is grayish brown, friable silt loam.

Cisne soils are nearly level or depressional and are poorly drained. They formed in 40 to more than 60 inches of loess and in the underlying silty sediments. They are generally on broad flats and in slight depressions. Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is mottled, friable silt loam about 12 inches thick. The upper part is grayish brown, and the lower part is light brownish gray. The subsoil extends below a depth of 60 inches. It is grayish brown and light brownish gray and is mottled. The upper part is firm silty clay, the next part is firm silty clay loam, and the lower part is friable silt loam.

Darmstadt soils are nearly level and gently sloping and are somewhat poorly drained. They formed in loess more than 60 inches thick or in loess and the underlying silty sediments. They are intermingled with areas of the Oconee soils on broad upland divides. Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown and light brownish gray, mottled, friable silt loam about 10 inches thick. The subsoil extends below a depth of 60 inches. It has a high content of sodium. The upper part is pale brown, mottled, firm silty clay loam. The next part is light brownish gray, mottled, firm silty clay loam. The lower part is light brownish gray, mottled, friable silt loam.

Minor in this association are the somewhat poorly drained Blair, poorly drained Huey, and moderately well drained Richview soils. Blair soils formed in silty sediments on slopes along the upper end of drainageways. Huey soils have a high content of sodium

in the subsoil. They are intermingled with areas of the Cisne soils. Richview soils are on prominent knolls and ridges.

In most areas the major soils are used for cultivated crops. A few areas are used for hay and pasture. The major soils generally are well suited or moderately suited to corn, soybeans, small grain, hay, and pasture. They generally are poorly suited to dwellings, septic tank absorption fields, and local roads and streets. A seasonal high water table, slow or very slow permeability, the hazard of erosion, and the high content of sodium in Darmstadt soils are the major management concerns.

Sloping to Steep, Well Drained to Somewhat Poorly Drained Soils; on Uplands

These soils are in areas characterized by a well established dendritic drainage system. They have a light colored surface layer. They generally are on narrow, convex ridgetops and side slopes. Some areas are on narrow bottom land. The soils on ridgetops are suited to cultivated crops, hay, and pasture. The soils on side slopes are poorly suited or unsuited to cultivated crops. All of the soils are well suited or moderately suited to woodland. They are moderately suited or poorly suited to dwellings and are poorly suited to septic tank absorption fields and to local roads and streets. Slope, low strength, slow or very slow permeability, a seasonal high water table, and the hazard of erosion are management concerns.

7. Hosmer-Hickory-Blair Association

Sloping to steep, well drained to somewhat poorly drained soils formed in loess, glacial till, and silty sediments; on uplands

This association consists mainly of soils along drainageways and on narrow drainage divides. Scattered narrow areas of nearly level soils on bottom land are throughout the association. Slopes range from 5 to 60 percent.

This association makes up about 15 percent of the county. It is about 28 percent Hosmer soils, 26 percent Hickory soils, 24 percent Blair soils, and 22 percent minor soils (fig. 5).

Hosmer soils generally are strongly sloping and are moderately well drained. They formed in loess. They are on narrow drainage divides and at the upper end of drainageways. Typically, the surface layer is yellowish brown and brown, friable silty clay loam about 6 inches thick. The subsoil extends below a depth of 60 inches. It is mottled. The upper part is brown and yellowish brown, friable silt loam; the next part is yellowish brown, firm, slightly brittle silty clay loam; and the lower part is yellowish brown, firm silt loam.

Hickory soils are strongly sloping to steep and are well drained and moderately well drained. They formed in glacial till or in a thin mantle of loess and the underlying glacial till. They are along drainageways. Typically, the surface layer is very dark grayish brown, friable silt loam about 1 inch thick. The subsurface layer is brown and very dark grayish brown silt loam about 3 inches thick. The subsoil to a depth of more than 60 inches is yellowish brown, mottled, friable clay loam.

Blair soils are sloping and strongly sloping and are somewhat poorly drained. They formed in a thin mantle of loess and in the underlying silty sediments. They are generally along the upper end of drainageways and tributaries to the larger streams. Typically, the surface layer is yellowish brown, mottled, firm silty clay loam or silt loam about 5 inches thick. The subsoil is about 50 inches thick. It is mottled and friable. The upper part is grayish brown and dark grayish brown silty clay loam and silt loam. The next part is light brownish gray silt loam. The lower part is gray silt loam. The substratum to a depth of 60 inches or more is gray, mottled, friable silt loam. A few pebbles and noticeable grains of sand are throughout the profile.

Minor in this association are the somewhat poorly drained Belknap and Stoy, poorly drained Bonnie, and well drained Wellston soils. Belknap and Bonnie soils are on narrow bottom land. Stoy soils are on the less sloping, broader divides and on low knolls and ridges. Wellston soils are intermingled with areas of the Hickory soils. They are underlain by shale and sandstone bedrock within a depth of 60 inches.

About 60 percent of this association is used for pasture or woodland, and about 40 percent is used for cultivated crops. The major soils generally are well suited or moderately suited to woodland, moderately suited or poorly suited to hay and pasture, and poorly suited or unsuited to corn, soybeans, and small grain. They are poorly suited to dwellings, septic tank absorption fields, and local roads and streets. Slope, the hazard of erosion, very slow or slow permeability, and a high shrink-swell potential are management concerns.

8. Ava-Hickory-Blair Association

Sloping to steep, well drained to somewhat poorly drained soils formed in loess, silty sediments, and glacial till; on uplands

This association consists mainly of soils along drainageways and on narrow drainage divides. Scattered narrow areas of nearly level soils on bottom land are throughout the association. Slopes range from 5 to 60 percent.

This association makes up about 11 percent of the county. It is about 28 percent Ava soils, 24 percent Hickory soils, 23 percent Blair soils, and 25 percent minor soils.

Ava soils generally are strongly sloping and are moderately well drained. They formed in loess and silty sediments. They are mainly on side slopes and narrow ridgetops. Typically, the surface layer is dark yellowish

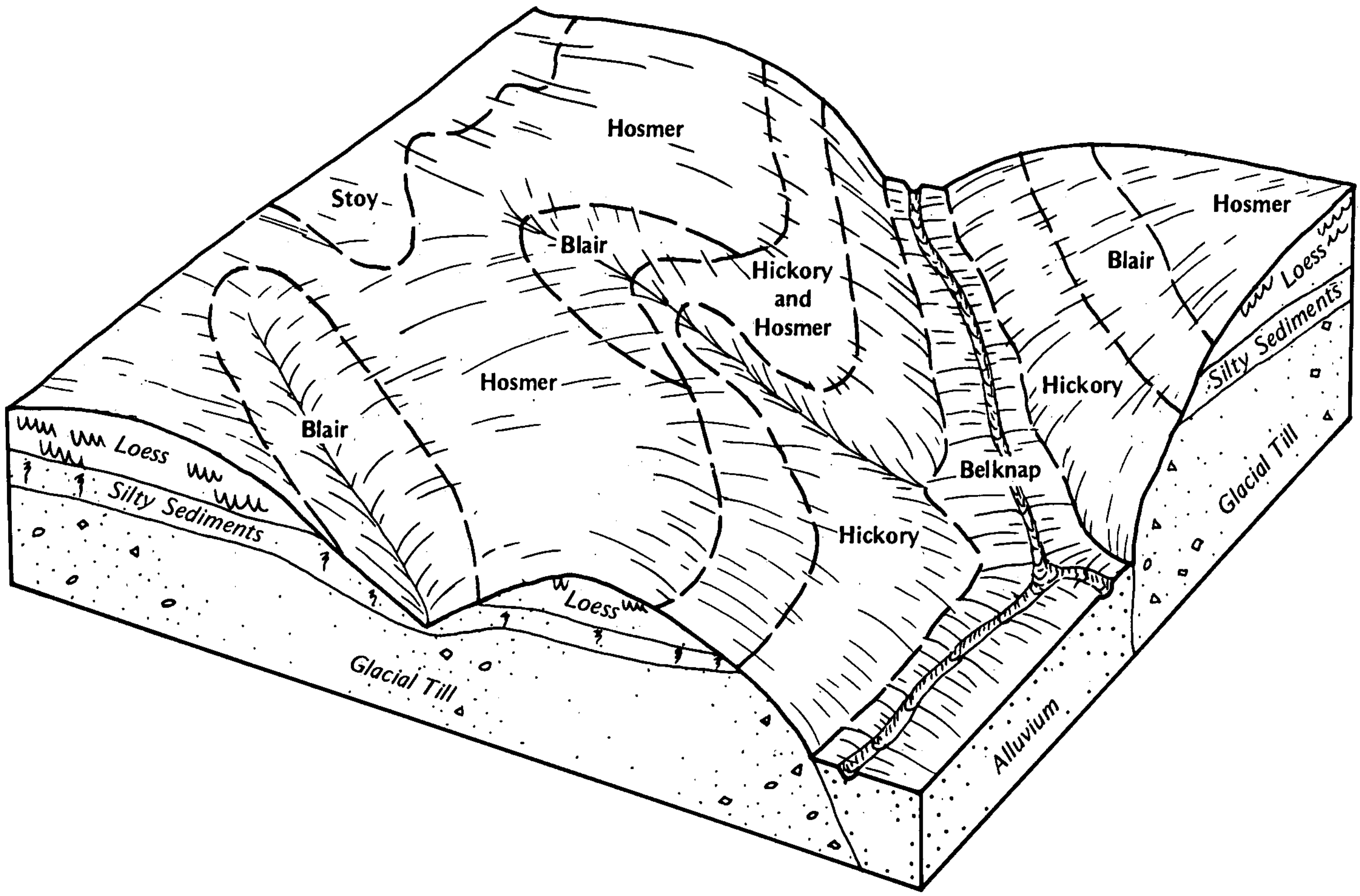


Figure 5.—Typical pattern of soils and parent material in the Hosmer-Hickory-Blair association.

brown, mottled, friable silty clay loam about 6 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, mottled, friable silty clay loam. The next part is yellowish brown, mottled, firm, slightly brittle silt loam and silty clay loam. The lower part is yellowish brown and grayish brown, firm clay loam.

Blair soils are sloping and strongly sloping and are somewhat poorly drained. They formed in silty sediments. They are generally along the upper end of drainageways. Typically, the surface layer is yellowish brown, mottled, firm silty clay loam or silt loam about 5 inches thick. The subsoil is about 50 inches thick. It is mottled and friable. The upper part is grayish brown and dark grayish brown silty clay loam and silt loam. The next part is light brownish gray silt loam. The lower part is gray silt loam. The substratum to a depth of 60 inches or more is gray, mottled, friable silt loam. A few pebbles and noticeable grains of sand are throughout the profile.

Hickory soils are strongly sloping to steep and are well drained. They formed in glacial till or in glacial till that has a thin mantle of loess. They are on side slopes along drainageways. Typically, the surface layer is very dark grayish brown, friable silt loam about 1 inch thick. The subsurface layer is brown and very dark grayish brown silt loam about 3 inches thick. The subsoil to a depth of 60 inches or more is yellowish brown, mottled, friable clay loam.

Minor in this association are the somewhat poorly drained Atlas, Belknap, and Bluford soils, the poorly drained Bonnie soils, and the well drained Wellston soils. Atlas soils formed in loess or silty sediments and in a paleosol and have more clay in the subsoil than the major soils. They are on side slopes between areas of the Ava and Hickory soils. Belknap and Bonnie soils are on narrow bottom land. Bluford soils are generally on the less sloping, broader upland divides. Wellston soils are intricately mixed with areas of the Hickory soils. They are

underlain by shale and sandstone bedrock within a depth of 60 inches.

About 60 percent of this association is used for pasture or woodland and about 40 percent for cultivated crops. The major soils generally are well suited or moderately suited to woodland, moderately suited or poorly suited to hay and pasture, and poorly suited or unsuited to corn, soybeans, and small grain. They are poorly suited to dwellings, septic tank absorption fields, and local roads and streets. Slope, the hazard of erosion, very slow permeability, and a high shrink-swell potential are management concerns.

Orthents and Gently Sloping to Steep, Well Drained Soils; on Uplands

These soils are in surface-mined areas. These areas have numerous long and narrow bodies of water. They provide good habitat for wildlife and can be used for various kinds of recreational development. The more recently mined areas have been reclaimed and are generally less sloping than the other areas. During reclamation, surface soil material was replaced on the surface. These areas are used dominantly as cropland.

9. Lenzburg-Orthents-Morristown Association

Orthents and gently sloping to steep, well drained soils formed in cast overburden; in surface-mined areas

This association consists of soils on a landscape reconstructed from material derived from surface mining. The topography varies, depending on the degree of reclamation. The less recently mined areas are characterized by steep slopes, narrow ridges and valleys, and many stones and boulders. The more recently mined and reclaimed areas typically have gentler slopes, fewer stones, and replaced topsoil. Slopes range from 1 to 60 percent.

This association makes up about 17 percent of the county. It is about 39 percent Lenzburg soils, 20 percent Orthents, 15 percent Morristown soils, and 26 percent minor soils.

Lenzburg soils are gently sloping to steep. They are generally in the less recently mined areas. The landscape is characterized by roughly parallel, narrow ridges and valleys with connecting steep side slopes. The less sloping areas are characterized by varying degrees of grading, which has altered the parallel ridges and valleys. Typically, the surface layer is mixed very dark gray and dark yellowish brown gravelly silty clay loam about 3 inches thick. The substratum extends to a depth of 60 inches or more. In sequence downward, it is gray and yellowish brown, mottled, firm silty clay loam; brown and yellowish brown, mottled, firm silty clay loam; and yellowish brown and gray, mottled, firm gravelly silty clay loam.

Orthents are nearly level to sloping and are somewhat poorly drained to well drained. These soils are in cut and filled areas, in borrow areas, and at construction and work sites in surface-mined areas. They consist of silty or loamy material. Where surface mining is active, they include cast overburden, which is a mixture of loess, glacial till, and bedrock. In a typical cut area, the surface layer is mixed brown, yellowish brown, and light brownish gray silt loam about 6 inches thick. The substratum to a depth of more than 60 inches is mottled silty clay loam. The upper part is pale brown, and the lower part is light brownish gray. In a typical filled area, the surface layer is about 10 inches of dark grayish brown, mottled silt loam and silty clay loam. The substratum to a depth of 60 inches or more is light brownish gray and gray, mottled silt loam, silty clay loam, loam, and clay loam.

Morristown soils are steep and are well drained. They are generally in the less recently mined areas. They are characterized by roughly parallel, narrow ridges and valleys with steep connecting side slopes. Typically, the surface layer is yellowish brown, friable cobbly silty clay loam about 2 inches thick. The substratum is mottled and friable. The upper part is yellowish brown cobbly clay loam. The lower part to a depth of 60 inches or more is brownish yellow very bouldery clay loam.

Minor in this association are the moderately well drained Schuline and Swanwick soils. Schuline soils have been recently mined and reclaimed. They are characterized by a mixture of premined soil and glacial till. They have a lower content of coarse fragments than the major soils. Swanwick soils have been recently reclaimed, are more compact than the major soils, and have a lower content of sand and coarse fragments.

About 60 percent of this association is used for pasture or woodland and about 40 percent for hay, small grain, and row crops. The major soils generally are poorly suited to corn, soybeans, and small grain. They are moderately suited or well suited to hay, pasture, and woodland. They are poorly suited or moderately suited to dwellings, septic tank absorption fields, and local roads and streets. Slope, slow permeability, soil slippage, differential settling, the content of large stones, and the hazard of erosion are the major management concerns.

Broad Land Use Considerations

The soils in Perry County vary widely in their suitability for major land uses. Approximately 41 percent of the county is used for cultivated crops. This cropland is in scattered areas throughout the county, mainly in associations 1 through 6, which are well suited or moderately suited to cultivated crops. Associations 1 and 2 are subject to flooding, which causes slight or moderate crop damage. Wetness also is a major limitation. A seasonal high water table, slow or very slow permeability, and the erosion hazard are the major management concerns affecting crop production in associations 3 through 6. A high content of sodium in

the subsoil of the Darmstadt soils in association 6 also is a concern.

Approximately 14 percent of the county is hayland or pasture. All of the associations have soils that are well or moderately suited to hay and pasture. Associations 7, 8, and 9 are better suited to hay and pasture than to cultivated crops.

About 15 percent of the county was wooded in 1980 (*5*). Associations 1, 2, 7, 8, and 9 have the largest areas of woodland. These associations generally are well or moderately suited to woodland. In associations 1 and 2, the equipment limitation is severe because of wetness. It can be overcome by harvesting during the drier periods or by using special equipment. Because of the slope, the equipment limitation is a management concern in many areas of associations 7, 8, and 9. The steeper areas of Hickory soils are examples.

A few areas in the county are used for urban development. In general, the soils that are best suited to urban uses are the gently sloping to strongly sloping Ava, Hickory, Hosmer, and Lenzburg soils, which are mainly in associations 3, 7, 8, and 9. In the other associations low strength, a seasonal high water table, a high shrink-swell, slow or very slow permeability, and slope are the major limitations. Soils on flood plains, such as those in association 1, are generally unsuited to urban development because of flooding. Sites that are suitable for houses or small commercial buildings, however, are generally available in nearby areas.

The suitability of the soils in the county for recreational uses ranges from good to poor, depending primarily on the intensity of the expected use. The soils in association 9 that have a slope of less than 6 percent are moderately suited to intensive recreational uses. Associations 1 and 2 are poorly suited to most recreational uses because of flooding. Most of the associations have some soils that are well suited or moderately suited to the less intensive recreational uses, such as trails for hiking or horseback riding.

Associations 2, 3, 4, 7, 8, and 9 are well suited to habitat for openland and woodland wildlife. Associations 1, 5, and 6 are well suited or moderately suited to habitat for wetland life.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Blair silty clay loam, 10 to 18 percent slopes, severely eroded, is a phase of the Blair series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Hickory-Hosmer silty clay loams, 10 to 18 percent slopes, severely eroded, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Dumps, slurry, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The names of some of the map units on the detailed maps of this county do not coincide with those of the map units on the maps of Jackson and Randolph Counties. Differences result from refinements in series concepts, variations in the extent of individual soils, and the application of the latest soil classification system. The soils in these map units have similar properties and similar suitabilities and potentials for major land uses. The differences in map unit names do not significantly affect the use and management of the soils.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

2—Cisne silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. Individual areas are irregular in shape and range from 3 to 500 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is mottled, friable silt loam about 12 inches thick. The upper part is grayish brown, and the lower part is light brownish gray. The subsoil extends below a depth of 60 inches. The upper part is grayish brown and light brownish gray, mottled, firm silty clay; the next part is grayish brown, mottled, firm silty clay loam; and the lower part is light brownish gray, mottled, friable silt loam. In places the surface layer is lighter in color.

Included with this soil in mapping are small areas of the somewhat poorly drained Hoyleton soils; the sodium affected, somewhat poorly drained Darmstadt soils; and the sodium affected, poorly drained Huey soils. Hoyleton and Darmstadt soils are in the slightly higher positions on the landscape. Huey soils are in positions on the landscape similar to those of the Cisne soil. Also included, in areas where underground mining was active

in the past, are soils in mine sinks that are depressional and are subject to ponding. Included soils make up 5 to 10 percent of the unit.

Air and water move through the Cisne soil at a very slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is within a depth of 2 feet from February through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is very strongly acid to medium acid in the subsoil and very strongly acid to mildly alkaline in the surface layer. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to corn, soybeans, small grain, hay, and pasture. It is poorly suited to woodland and to dwellings and septic tank absorption fields.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain or improve the drainage system are needed. The seasonal high water table delays planting or harvesting in some years. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the seasonal high water table, and the high potential for frost action are limitations. Replacing the base material with suitable fill material and installing a drainage system help to overcome these limitations.

The land capability classification is IIIw.

3A—Hoyleton silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad upland ridges. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsurface layer is brown, mottled, friable silt loam about 7 inches thick. The subsoil is about 35 inches thick. In sequence downward, it is red and strong brown, firm silty clay that has light gray silt coatings; brown, mottled, firm silty clay; light brownish gray and pale brown, mottled, firm silty clay loam; and brown, mottled, friable silt loam. The substratum to a depth of 60 inches or more is brown, mottled, friable silt loam. In some areas the surface layer is lighter in color.

Included with this soil in mapping are small areas of the poorly drained Cisne soils in slight depressions. Also included are small areas of the sodium affected, somewhat poorly drained Darmstadt soils and the sodium affected, moderately well drained Tamalco soils. Darmstadt soils are in positions on the landscape similar to those of the Hoyleton soil. Tamalco soils are on the slightly higher ridges. Included soils make up 5 to 10 percent of the unit.

Air and water move through the Hoyleton soil at a slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is very strongly acid to medium acid in the subsoil and very strongly acid to neutral in the surface layer. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to corn, soybeans, small grain, hay, and pasture and moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. Measures that maintain or improve the drainage system are needed. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank

helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the high shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIw.

3B—Hoyleton silt loam, 2 to 4 percent slopes. This gently sloping, somewhat poorly drained soil is on mounds, knolls, and ridges in the uplands. Individual areas are generally round or elongated and range from 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is brown and yellowish brown, mottled, friable silt loam about 3 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, mottled, friable and firm silty clay loam. The next part is pale brown and light brownish gray, mottled, firm and friable silty clay loam. The lower part is light brownish gray, grayish brown, yellowish brown, and dark yellowish brown, friable silt loam. In some areas the surface layer is lighter in color. In other areas the slope is less than 2 percent.

Included with this soil in mapping are small areas of the sodium affected Darmstadt and Tamalco soils. These soils are in landscape positions similar to those of the Hoyleton soil. They make up 2 to 5 percent of the unit.

Air and water move through the Hoyleton soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is very strongly acid to neutral in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to corn, soybeans, small grain, hay, and pasture and moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard and the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the high shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

3B2—Hoyleton silt loam, 2 to 6 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on side slopes along drainageways and on the sides of some mounds, knolls, and ridges in the uplands. Individual areas are generally elongated or irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown and dark yellowish brown, friable silt loam about 7 inches thick. The surface soil has been thinned by erosion. The subsoil extends below a depth of 60 inches. The upper part is brown, mottled, firm silty clay loam. The next part is light brownish gray and grayish brown, mottled, firm silty clay loam. The lower part is yellowish brown, gray, and strong brown, firm and friable silty clay loam and silt loam. In some areas the surface layer is lighter in color. In other areas the soil is uneroded. In areas where erosion has been more severe, the surface layer is silty clay loam.

Included with this soil in mapping are small areas of the sodium affected Darmstadt and Tamalco soils. These soils are in positions on the landscape similar to those of the Hoyleton soil. Also included are some areas of the eroded Blair soils, mainly on the steeper side slopes. Included soils make up 10 to 15 percent of the unit.

Air and water move through the Hoyleton soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is strongly acid to neutral in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential is high in the upper part of the

subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to corn, soybeans, small grain, hay, and pasture and moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard and the seasonal high water table is a limitation. Surface ditches help to remove excess surface water. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the high shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

4B—Richview silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on upland knobs and ridges. Individual areas are generally rounded or elongated and range from 3 to 20 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 7 inches thick. The subsoil extends below a depth of 60 inches. The upper part is dark yellowish brown, friable silty clay loam. The next part is brown, mottled, friable silty clay loam. The lower part is strong brown and brown, mottled, friable silt loam and clay loam. In some areas the surface layer is lighter in color. In other areas the seasonal high water table is below a depth of 6 feet. In places the slope is more than 5 percent.

Included with this soil in mapping are areas of the somewhat poorly drained Hoyleton soils. These soils are in the less sloping areas. They make up 2 to 5 percent of the unit.

Air and water move through the Richview soil at a moderate rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 4 to 6 feet from February through May in most years. Available water capacity is high. Organic matter content is moderate. Reaction is neutral to very strongly acid in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to corn, soybeans, small grain, hay, and pasture. It is moderately suited to woodland and to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the shrink-swell potential is a limitation. The wetness is an additional limitation on sites for dwellings with basements. Foundations should be designed so that they can withstand the shrink-swell movement of the soil. Installing subsurface drains at the base of the foundations helps to overcome the wetness.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the moderate permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption field helps to overcome the restricted permeability.

In areas used as sites for local roads and streets, low strength and the potential frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

4C2—Richview silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on the sides of knobs and ridges in the uplands. Individual areas are generally irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is dark brown and dark yellowish brown, friable silt loam about 7 inches. It is mixed with material from the subsoil. The subsoil is about 43 inches thick. The upper part is brown, mottled, firm silty clay loam. The next part is brown, mottled, friable silty clay loam. The lower part is yellowish red,

mottled, friable silt loam. The substratum to a depth of 60 inches or more is strong brown, mottled, friable silty clay loam. In places the surface layer is silty clay loam.

Included with this soil in mapping are small areas of Ava and Hosmer soils. These soils are in positions on the landscape similar to those of the Richview soil. They have brittle layers in the subsoil and are very slowly permeable. They make up 2 to 5 percent of the unit.

Air and water move through the Richview soil at a moderate rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 4 to 6 feet from February through May in most years. Available water capacity is high. Organic matter content is moderate. Reaction is neutral to medium acid in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to corn, soybeans, small grain, and woodland. It is well suited to hay and pasture. It is moderately suited to dwellings and septic tank absorption fields.

In the areas used for cultivated crops, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the shrink-swell potential is a limitation. The wetness is an additional limitation on sites for dwellings with basements. Foundations should be designed so that they can withstand the shrink-swell movement of the soil. Installing subsurface drains at the base of the foundations helps to overcome the wetness.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the moderate permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption field helps to overcome the restricted permeability.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIe.

5C3—Blair silty clay loam, 5 to 10 percent slopes, severely eroded. This sloping, somewhat poorly drained soil is on side slopes near the head of drainageways cut into glacial till plains. In most areas, nearly all of the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas are elongated and range from 3 to 60 acres in size.

Typically, the surface layer is dark yellowish brown, friable silty clay loam about 7 inches thick. The subsoil extends below a depth of 60 inches. In sequence downward, it is yellowish brown, friable silty clay loam; dark grayish brown and dark gray, friable silty clay loam; gray, mottled, friable clay loam; and gray, mottled, firm silty clay loam. The subsoil has a noticeable content of sand and pebbles throughout.

Included with this soil in mapping are small areas of the moderately well drained Ava and somewhat poorly drained Bluford soils on the upper part of the slopes. Also included, near the upper end of drainageways, are small areas of Darmstadt soils, which have a concentration of sodium in the subsoil. Included soils make up 10 to 15 percent of the unit.

Air and water move through the Blair soil at a moderately slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is at a depth of 1.5 to 3.5 feet from March through June in most years. Available water capacity is high. Organic matter content is low. The soil is very strongly acid to mildly alkaline throughout. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is poorly suited to corn, soybeans, and small grain. It is moderately suited to hay, pasture, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for cultivated crops, further erosion is a severe hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

In areas used for hay and pasture, erosion is a hazard. A nurse crop or rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Overgrazing reduces forage yields and causes excessive compaction, runoff, and erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface drains at the base of foundations

helps to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the moderately slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. Underground drains help to lower the water table. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IVe.

5D—Blair silt loam, 10 to 18 percent slopes. This strongly sloping, somewhat poorly drained soil is on side slopes near the upper end of drainageways. Individual areas are long and narrow or irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer is yellowish brown, friable silt loam about 9 inches thick. The subsoil to a depth of more than 60 inches is mottled silty clay loam. The upper part is brown and firm, the next part is grayish brown and firm, and the lower part is gray and light gray and is friable. In some areas the subsoil has more clay.

Included with this soil in mapping are small areas of the moderately well drained Ava and Hosmer and well drained Hickory soils. Ava and Hosmer soils are on side slopes above the Blair soil. Hickory soils generally are on side slopes below the Blair soil. Also included are small areas of Belknap and Bonnie soils on narrow bottom land. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Blair soil at a moderately slow rate. Surface runoff is medium in timbered areas. The seasonal high water table is at a depth of 1.5 to 3.5 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. The soil is very strongly acid to mildly alkaline throughout. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used as woodland. It is poorly suited to corn, soybeans, and small grain. It is moderately suited to hay, pasture, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In areas used for cultivated crops, erosion is a severe hazard. A crop rotation dominated by forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

In areas used as pasture, erosion is a hazard, especially during periods when the pasture is becoming established. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In the areas used as woodland, excluding livestock and preventing fires are management concerns. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as sites for dwellings, the seasonal high water table, the shrink-swell potential, and the slope are limitations. Installing subsurface drains at the base of foundations helps to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil. Cutting and filling help to overcome the slope.

In areas used as sites for septic tank absorption fields, the seasonal high water table, the moderately slow permeability, and the slope are limitations. Underground drains help to lower the water table. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome the wetness and the restricted permeability. Land leveling is needed. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IVe.

5D3—Blair silty clay loam, 10 to 18 percent slopes, severely eroded. This strongly sloping, somewhat poorly drained soil is on side slopes near the upper end of drainageways cut into glacial till plains. In most areas, nearly all of the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas are elongated and range from 3 to 60 acres in size.

Typically, the surface layer is yellowish brown, mottled, firm silty clay loam about 5 inches thick. The subsoil is about 50 inches thick. It is mottled and friable. The upper part is grayish brown and dark grayish brown silty clay loam and silt loam, the next part is light brownish gray silt loam, and the lower part is gray silt loam. The substratum to a depth of 60 inches or more is gray, mottled, friable silt loam. A few pebbles and noticeable sand grains are throughout the profile.

Included with this soil in mapping are small areas of the moderately well drained Ava and Hosmer and well drained Hickory soils. Ava and Hosmer soils are on side slopes above the Blair soil. Hickory soils are on side

slopes below the Blair soil. Also included are small areas of Belknap and Bonnie soils on narrow bottom land. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Blair soil at a moderately slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is at a depth of 1.5 to 3.5 feet from March through June in most years. Available water capacity is high. Organic matter content is low. Reaction is very strongly acid to neutral in the subsoil and strongly acid to neutral in the surface layer. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is cultivated. It is generally unsuited to cultivated crops because of the slope and the hazard of further erosion. A permanent cover of pasture plants or trees is needed. The soil is moderately suited to hay, pasture, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In areas used as pasture, further erosion is a severe hazard, especially during periods when the pasture is becoming established. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In areas used as woodland, excluding livestock and preventing fires are management concerns. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as sites for dwellings, the seasonal high water table, the shrink-swell potential, and the slope are limitations. A drainage system helps to lower the water table. Cutting and filling help to overcome the slope. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table, the moderately slow permeability, and the slope are limitations. Underground drains help to lower the water table. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome the wetness and the restricted permeability. Land leveling is needed. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is VIe.

7D3—Atlas silty clay loam, 10 to 18 percent slopes, severely eroded. This strongly sloping, somewhat poorly drained soil is on side slopes near the upper end of drainageways. In most areas, nearly all of the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas are elongated and range from about 3 to 60 acres in size.

Typically, the surface layer is brown, friable silty clay loam about 5 inches thick. The subsoil extends below a depth of 60 inches. It is mottled and firm. The upper part is yellowish brown silty clay loam and grayish brown silty clay, the next part is light brownish gray silty clay loam, and the lower part is gray clay loam. In some areas the subsoil has less clay. In the less eroded areas, the surface layer is silt loam.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on the slightly steeper slopes below the Atlas soil. Also included are small areas of Belknap and Bonnie soils on narrow bottom land. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Atlas soil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is within a depth of 2 feet from April through June in most years. Available water capacity is moderate. Organic matter content is moderately low. Reaction is very strongly acid to mildly alkaline in the subsoil and medium acid to neutral in the surface layer. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is cultivated. It is generally unsuited to cultivated crops because of the hazard of further erosion. A permanent cover of pasture plants or trees is needed. The soil is moderately suited to hay, pasture, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In areas used as pasture, erosion is a hazard, especially during periods when the pasture is becoming established. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In areas used as woodland, seedling mortality and windthrow are management concerns because of the high content of clay in the subsoil. The seedling mortality rate can be reduced by selecting planting stock that is larger than is typical. Applying harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland reduce the windthrow hazard. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. A drainage system helps to lower the water table. Foundations should be designed so that they can withstand the shrink-swell movement of the soil. Cutting and filling are needed in the more sloping areas.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the seasonal high water table, and the high potential for frost action are limitations. Replacing the base material with suitable fill material and installing a drainage system help to overcome these limitations.

The land capability classification is VIe.

8E—Hickory silt loam, 18 to 30 percent slopes. This moderately steep, moderately well drained soil is on side slopes in strongly dissected areas on glacial till plains. Individual areas are elongated or irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, friable silty clay loam. The next part is yellowish brown, mottled, firm clay loam. The lower part is light gray, gray, and light olive gray, mottled, firm clay loam. In some eroded areas the surface layer has more clay.

Included with this soil in mapping are small areas where sandstone or shale crops out on the lower part of the slopes. Also included are small areas of Ava soils and the somewhat poorly drained Atlas and Blair soils. Ava soils have less clay throughout than the Hickory soil. They are on the upper part of the slopes near the crest of ridges. Atlas and Blair soils are in the less sloping areas above the Hickory soil and also are at the upper end of drainageways. Included areas make up 5 to 10 percent of the unit.

Air and water move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Reaction is very strongly acid to moderately alkaline in the subsoil. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used as woodland. It is well suited to woodland and to habitat for woodland wildlife. It is generally unsuited to cultivated crops and to hay because of the slope and the hazard of erosion. It is moderately suited to pasture and poorly suited to dwellings and septic tank absorption fields.

In the areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Plant competition also is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Limiting the use of machinery to periods when the soil is firm and dry helps to overcome the equipment limitation. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as pasture, erosion is a serious hazard. Also, establishing pasture on these moderately steep slopes is difficult. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In areas used as sites for dwellings, the slope and the shrink-swell potential are limitations. Cutting and filling help to overcome the slope. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In the areas used as sites for septic tank absorption fields, the slope and the moderate permeability are limitations. Installing the filter lines on the contour and enlarging the absorption field help to overcome these limitations.

In areas used as sites for local roads and streets, low strength and the slope are limitations. Cutting and filling help to overcome the slope. Replacing the base material with suitable fill material helps to prevent the damage caused by low strength.

The land capability classification is VIe.

8E3—Hickory silty clay loam, 18 to 30 percent slopes, severely eroded. This moderately steep, well drained soil is on side slopes in strongly dissected areas on glacial till plains. In most areas, erosion has removed most of the original surface soil and tillage has mixed the rest with the upper part of the subsoil. Individual areas are irregular in shape or elongated and range from 3 to 60 acres in size.

Typically, the surface layer is dark yellowish brown and brown, friable silty clay loam about 6 inches thick. The subsoil extends below a depth of 60 inches. The upper part is dark yellowish brown, friable silty clay loam. The next part is brown, friable clay loam. The lower part is brown and strong brown, mottled, firm clay loam. In places the surface layer is clay loam.

Included with this soil in mapping are small areas where sandstone or shale crops out near the base of the

slopes. Also included are small areas of the moderately well drained Ava and Hosmer and somewhat poorly drained Atlas and Blair soils. Ava and Hosmer soils have a brittle layer in the subsoil and are very slowly permeable. They are on the upper part of the slopes near the crest of ridges. Atlas and Blair soils are on the less sloping side slopes above the Hickory soil. Included areas make up 10 to 15 percent of the unit.

Air and water move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is low. The soil is very strongly acid to moderately alkaline throughout The shrink-swell potential and the potential for frost action are moderate.

Most areas are pastured. Some are used for cultivated crops. Others are idle. This soil is generally unsuited to cultivated crops and to hay because of the slope and the hazard of further erosion. It is well suited to woodland. It is poorly suited to pasture and to dwellings and septic tank absorption fields.

In the areas used as pasture, further erosion is a severe hazard. Also, establishing pasture on these moderately steep slopes is difficult. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

This soil originally was wooded. Conversion of the woodland to cropland, hayland, and pasture has resulted in severe erosion. Reestablishing the woodland is a good management alternative. The erosion hazard and the equipment limitation are management concerns because of the slope. Plant completion also is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Limiting the use of machinery to periods when the soil is firm and dry helps to overcome the equipment limitation. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as sites for dwellings, the slope and the shrink-swell potential are limitations. Cutting and filling help to overcome the slope. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the slope and the moderate permeability are limitations. Installing the filter lines on the contour and enlarging the absorption field help to overcome these limitations.

In areas used as sites for local roads and streets, low strength and the slope are limitations. Cutting and filling help to overcome the slope. Replacing the base material with suitable fill material helps to prevent the damage caused by low strength.

The land capability classification is VIe.

8G—Hickory silt loam, 30 to 60 percent slopes. This steep, well drained soil is on side slopes along drainageways. Individual areas are mainly long and narrow and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 1 inch thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil to a depth of 60 inches or more is yellowish brown, friable clay loam. It has mottles in the lower part. In some eroded areas the surface layer has more clay.

Included with this soil in mapping are small areas where sandstone or shale crops out on the lower part of the slopes and along narrow stream channels and small areas of the moderately well drained Ava and Hosmer soils on narrow ridges that divide the steep slopes. Also included are small areas of narrow bottom land along small streams. Included areas make up 10 to 15 percent of the unit.

Air and water move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. Reaction is very strongly acid to moderately alkaline in the subsoil. The shrink-swell potential and the potential for frost action are moderate.

Most areas are used as woodland. A few are used as pasture. This soil is moderately suited to woodland and well suited to habitat for woodland wildlife. It is generally unsuited to cultivated crops, hay, pasture, dwellings, and septic tank absorption fields because of the slope.

In the areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Plant competition also is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Limiting the use of machinery to periods when the soil is firm and dry helps to overcome the equipment limitation. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as habitat for woodland wildlife, adequate stands of herbaceous cover can be

maintained. The steep slope and low fertility, however, limit the extent of grain and seed crops. Less sloping areas that are suitable for these crops are generally included within or are adjacent to areas of this soil. Protection from fire and grazing is essential.

The land capability classification is VIIe.

12—Wynoose silt loam. This nearly level, poorly drained soil is on broad upland flats. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 7 inches thick. The subsurface layer is grayish brown and light gray, friable silt loam about 9 inches thick. The subsoil extends below a depth of 60 inches. It is light brownish gray and mottled. The upper part is firm silty clay, and the lower part is firm and friable silty clay loam. In some areas the subsoil is browner. In other areas the surface layer is darker. In places the upper part of the subsoil has less clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Darmstadt and poorly drained Huey soils. These soils have a concentration of sodium in the subsoil. Darmstadt soils are slightly higher on the landscape than the Wynoose soil. Huey soils are in landscape positions similar to those of the Wynoose soil or are in slightly depressional areas.

Air and water move through the Wynoose soil at a very slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is within a depth of 2 feet from March through June in most years. Available water capacity is moderate. Organic matter content is moderately low. Reaction is extremely acid to medium acid in the subsoil and very strongly acid to mildly alkaline in the surface layer. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops, hay, and pasture. It is poorly suited to woodland and to dwellings and septic tank absorption fields.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain or improve the drainage system are needed. The seasonal high water table delays planting or harvesting in some years. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the wetness, and the potential for frost action are limitations. Replacing the base material with suitable fill material and installing a subsurface and surface drainage system help to overcome these limitations.

The land capability classification is IIIw.

13A—Bluford silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad upland ridges. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsurface layer is friable silt loam about 6 inches thick. It is light brown. The subsoil is about 34 inches thick. The upper part is yellowish brown, mottled, friable silty clay loam. The next part is brown, mottled, firm silty clay. The lower part is light brownish gray, mottled, firm, slightly brittle silty clay loam. The substratum to a depth of 60 inches or more is light brownish gray, mottled, friable silt loam. In some areas the subsoil is grayer. In other areas the surface layer is darker. In places the subsoil is extremely acid.

Included with this soil in mapping are small areas of the somewhat poorly drained Darmstadt soils. These soils are in landscape positions similar to those of the Bluford soil. They have a high content of sodium in the subsoil. They make up less than 1 percent of the unit.

Air and water move through the Bluford soil at a slow rate. Surface runoff is slow in cultivated areas. The seasonal water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is very strongly acid in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the high potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIw.

13B—Bluford silt loam, 2 to 4 percent slopes. This gently sloping, somewhat poorly drained soil is on mounds, knolls, and ridges in the uplands. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsurface layer is yellowish brown, mottled, friable silt loam about 6 inches thick. The subsoil to a depth of 60 inches or more is mottled silty clay loam. The upper part is grayish brown and is firm and friable; the next part is yellowish brown and light brownish gray, firm, and slightly brittle; and the lower part is dark yellowish brown and friable. In some areas the surface layer is darker. In other areas the subsoil is extremely acid.

Included with this soil in mapping are small areas of the moderately well drained Ava soils in the slightly higher positions on the landscape. These soils make up 2 to 5 percent of the unit.

Air and water move through the Bluford soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard and the seasonal high water table is a limitation. Surface drains function satisfactorily if suitable outlets are available. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the high potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

13B2—Bluford silt loam, 2 to 6 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on the sides of upland knolls and ridges and on slopes along the upper end of drainageways. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is brown and dark brown, friable silt loam about 6 inches thick. The surface soil has been thinned by erosion. The subsoil is about 43 inches thick. It is mottled and is friable and firm. The upper part is brown silty clay loam; the next part is grayish brown and brown, slightly brittle silty clay loam; and the lower part is brown and dark brown silt loam. The substratum to a depth of 60 inches or more is brown and pinkish gray, mottled, firm and friable silt loam. In some areas the surface layer is silty clay loam. In other areas it is darker. In places the subsoil is extremely acid.

Included with this soil in mapping are small areas of Blair soils on the steeper slopes and the moderately well drained Ava soils on the slightly higher parts of the landscape. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Bluford soil at a slow rate. Surface runoff is medium in cultivated areas. The

seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is very strongly acid to medium acid in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is moderately suited to cultivated crops and to woodland. It is well suited to hay and pasture. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard and the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the high potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

14B—Ava silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridges in the uplands. Individual areas are circular or elongated and range from 3 to 75 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 8 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, friable silt loam. The next part is brown and pale brown, mottled, firm silty clay loam. The lower part is grayish brown, mottled, firm, slightly brittle silt loam. In some areas gray mottles are higher in the subsoil. In other areas the subsoil is not mottled. In places it is extremely acid.

Included with this soil in mapping are small areas of the poorly drained Wynoose soils. These soils are in the lower positions on the landscape. They make up 2 to 5 percent of the unit.

Air and water move through the upper part of the Ava soil at a moderate or moderately slow rate and through the lower part at a very slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 2 to 4 feet from March through June in most years. Available water capacity is moderate. Organic matter content is moderately low. The subsoil is very strongly acid or strongly acid. It has a moderate shrink-swell potential. The potential for frost action is high.

In most areas this soil is cultivated. It is moderately suited to cultivated crops and well suited to hay, pasture, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface drains at the base of foundations helps to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the high potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded. This sloping, moderately well drained soil is on ridges and side slopes along upland drainageways. In most areas, nearly all of the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil.

Individual areas are irregular in shape or elongated and range from 5 to 75 acres in size.

Typically, the surface layer is dark yellowish brown, friable silty clay loam about 4 inches thick. The subsoil extends below a depth of 60 inches. The upper part is dark yellowish brown, mottled, firm silty clay loam. The next part is brown and strong brown, mottled, firm, slightly brittle silty clay loam. The lower part is brown and strong brown, mottled, friable silt loam. In some of the less eroded areas, particularly those that are wooded, the surface layer is silt loam. In places the subsoil is extremely acid.

Included with this soil in mapping are small areas of the somewhat poorly drained Blair and Bluford and well drained Hickory soils. Blair and Hickory soils are on slopes below the Ava soil. Bluford soils are in the less sloping areas on ridges above the Ava soil. Included soils make up 2 to 5 percent of the unit.

Air and water move through the upper part of the Ava soil at a moderate or moderately slow rate and through the slightly brittle part of the subsoil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is at a depth of 2 to 4 feet from March through June in most years. Available water capacity is moderate. Organic matter content is moderately low. Reaction is medium acid to very strongly acid in the subsoil and slightly acid or neutral in the surface layer. The shrink-swell potential in moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is poorly suited to cultivated crops and moderately suited to hay, pasture, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for cultivated crops, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as woodland, plant competition is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface drains at the base of foundations helps to overcome the wetness. The foundations should be designed so that they can to withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the high potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IVe.

26—Wagner silt loam. This nearly level, poorly drained soil is in low areas on stream terraces. It is subject to rare flooding. Individual areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface soil is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown and grayish brown, mottled, friable silt loam about 9 inches thick. The subsoil to a depth of more than 60 inches is grayish brown, mottled, very firm silty clay and silty clay loam. In some areas the surface layer is lighter colored.

Included with this soil in mapping are small areas of Colp and Hurst soils. The moderately well drained Colp soils are on knolls on the higher parts of the terraces or on terrace breaks. The somewhat poorly drained Hurst soils are slightly higher on the landscape than the Wagner soil. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Wagner soil at a very slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is within a depth of 2 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. Reaction is very strongly acid to neutral in the subsoil and strongly acid to moderately alkaline in the surface layer. The shrink-swell potential is high. The potential for frost action is moderate.

In most areas this soil is cultivated. It is moderately suited to cultivated crops, hay, and pasture and poorly suited to woodland. It is generally unsuited to dwellings and septic tank absorption fields because of the flooding.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain or improve the drainage system are needed. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferment of grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

The land capability classification is IIIw.

84—Okaw silt loam. This nearly level, poorly drained soil is on broad flats on stream terraces. It is frequently ponded in spring. It is subject to rare flooding, which lasts for brief periods. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 4 inches thick. The subsoil is grayish brown, mottled, firm silty clay about 42 inches thick. The substratum to a depth of 60 inches or more is grayish brown, mottled, firm silty clay. In some areas the surface layer is darker.

Included with this soil in mapping are small areas of Colp and Hurst soils. The moderately well drained Colp soils are on knolls on the higher parts of the terraces and on terrace breaks below the Okaw soil. The somewhat poorly drained Hurst soils are slightly higher on the terraces than the Okaw soil. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Okaw soil at a very slow rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below from March through June in most years. Available water capacity is moderate. Organic matter content is moderately low. Reaction is very strongly acid to medium acid in the subsoil and very strongly acid to neutral in the surface layer. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is cultivated. It is moderately suited to cultivated crops, hay, and pasture. It is poorly suited to woodland. It is generally unsuited to dwellings and septic tank absorption fields because of the flooding.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain the drainage system are needed. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferment of grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

The land capability classification is IIIw.

108—Bonnie silt loam. This nearly level, poorly drained soil is in low areas on flood plains. It is frequently flooded for long periods from January through May in most years (fig. 6) and is subject to ponding. Individual areas are elongated or irregular in shape and range from 10 to more than 1,000 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 6 inches thick. The substratum extends below a depth of 60 inches. It is mottled and friable. The upper part is light brownish gray and grayish brown silt loam, and the lower part is light brownish gray silty clay loam. In some areas, especially on extensive bottom land, the soil is silty clay loam throughout. In places the substratum is browner.

Included with this soil in mapping are small areas of the poorly drained Karnak soils. These soils are clayey throughout. They are in the slightly lower positions on the flood plains. They make up less than 1 percent of the unit.

Air and water move through the Bonnie soil at a moderately slow rate. Surface runoff is slow or ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below from January through June in most years. Available water capacity is high. Organic matter content is moderately low. Reaction generally is very strongly acid in the substratum and very strongly acid to neutral in the surface layer. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is cultivated. It is suited to cultivated crops, hay, pasture, and woodland. It is generally unsuited to dwellings and septic tank absorption fields because of the flooding and ponding.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain the drainage system are needed. Surface drains function satisfactorily if suitable outlets are available. Flooding generally occurs in winter and spring. It occasionally damages crops. Dikes and levees provide protection from flooding. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation and the frequent flooding is a hazard. Deferment of grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

The land capability classification is IIIw.

113—Oconee silt loam. This nearly level, somewhat poorly drained soil is on broad upland ridges. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown and pale brown, mottled, friable silt loam about 7 inches thick. The subsoil is about 37

Figure 6.—Flooding in an area of Bonnie silt loam.

inches thick. The upper part is brown, mottled, firm silty clay loam and silty clay. The next part is light brownish gray and grayish brown, mottled, firm silty clay loam. The lower part is grayish brown, mottled, friable silt loam. The substratum to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In places the surface layer is lighter colored.

Included with this soil in mapping are small areas of the sodium affected Darmstadt and Tamalco soils. Darmstadt soils have a surface layer that is lighter colored than that of the Oconee soil. They are in landscape positions similar to those of the Oconee soil. The moderately well drained Tamalco soils are on mounds and are higher on the landscape than the Oconee soil. Also, they have a lighter colored surface layer. Included soils make up about 5 percent of the unit.

Air and water move through the Oconee soil at a slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from March through June in most years. Available water

capacity is high. Organic matter content is moderate. Reaction is very strongly acid to neutral in the subsoil and medium acid to mildly alkaline in the surface layer. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. Surface drains function satisfactorily if suitable outlets are available. Measures that maintain the drainage system are needed. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferment of grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the high shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIw.

122B2—Colp silt loam, 2 to 7 percent slopes, eroded. This gently sloping, moderately well drained soil is on narrow ridgetops, knolls, and side slopes on low terraces. It is subject to rare flooding. Individual areas are elongated or irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown and dark yellowish brown, friable silt loam about 6 inches thick. The surface soil has been thinned by erosion. The subsoil extends below a depth of 60 inches. It is mottled and firm. The upper part is yellowish brown silty clay loam, the next part is light brownish gray silty clay loam, and the lower part is grayish brown, calcareous silty clay. In some areas the surface layer is silty clay loam. In other areas the subsoil is grayer throughout.

Included with this soil in mapping are small areas of the poorly drained Okaw soils on broad flats on the terraces. These soils make up about 5 percent of the unit.

Air and water move through the Colp soil at a slow rate. Surface runoff is medium or rapid in cultivated areas. The seasonal high water table is at a depth of 2 to 4 feet from March through June in most years. Available water capacity is high. Organic matter content is moderate. The soil is very strongly acid to moderately alkaline throughout. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is cultivated. It is moderately suited to cultivated crops, hay, pasture, and woodland. It is generally unsuited to dwellings and septic tank absorption fields because of the seasonal wetness, the slow permeability, and the flooding.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Installing surface drains helps to remove excess surface water. Deferment of grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for local road and streets, low strength and the high potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIe.

164A—Stoy silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad upland divides. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer is dark brown, mottled, friable silt loam about 3 inches thick. The subsoil is mottled silty clay loam about 39 inches thick. The upper part is yellowish brown and grayish brown and is friable, and the lower part is grayish brown and brown and is firm. The substratum to a depth of 60 inches or more is grayish brown, brown, and strong brown, mottled, friable and firm silt loam. In some areas the subsoil is grayer. In other areas the surface layer is darker. In some places the subsoil has more clay. In other places it is extremely acid.

Included with this soil in mapping are small areas of the somewhat poorly drained, sodium affected Darmstadt soils. These soils are in landscape positions

similar to those of the Stoy soil. They make up less than 1 percent of the unit.

Air and water move through the Stoy soil at a slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from February through April in most years. Available water capacity is high. Organic matter content is moderately low. Reaction is very strongly acid to medium acid in the subsoil and very strongly acid to slightly acid in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting in some years. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferment of grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIw.

164B—Stoy silt loam, 2 to 4 percent slopes. This gently sloping, somewhat poorly drained soil is on mounds, knolls, and ridges in the uplands. Individual areas are irregular in shape and range from 2 to about 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsurface layer is yellowish brown, mottled, friable silt loam about 7 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, mottled, friable silt loam. The next part is yellowish brown, pale brown, brown, and grayish brown, mottled, firm silty clay loam. The lower part is light brownish gray, mottled, slightly brittle, firm silty clay loam and yellowish brown, mottled, slightly brittle, firm silt loam. In some areas the surface layer is darker. In some places the subsoil has more clay. In other places it is extremely acid.

Included with this soil in mapping are small areas of the moderately well drained Hosmer soils. These soils are slightly higher on the landscape than the Stoy soil. They make up 2 to 5 percent of the unit.

Air and water move through the Stoy soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from February through April in most years. Available water capacity is high. Organic matter content is moderately low. Reaction is strongly acid or very strongly acid in the subsoil and very strongly acid to slightly acid in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard and the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

164B2—Stoy silt loam, 2 to 6 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on the sides of upland knolls and ridges and along the upper end of drainageways. Individual areas are irregular in shape and range from 3 to about 100 acres in size.

Typically, the surface layer is grayish brown and dark grayish brown, friable silt loam about 7 inches thick. The surface soil has been thinned by erosion. The subsoil is mottled silty clay loam about 39 inches thick. The upper part is yellowish brown and firm, and the lower part is grayish brown and brown and is friable. The substratum to a depth of 60 inches or more is gray, mottled, friable silt loam. In some areas the surface layer is silty clay loam. In other areas the subsoil is extremely acid.

Included with this soil in mapping are small areas of Blair soils on the steeper, lower slopes and the moderately well drained Hosmer soils in the higher positions on the landscape. Included soils make up about 3 to 8 percent of the unit.

Air and water move through the Stoy soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from February through April in most years. Available water capacity is high. Organic matter content is moderately low. Reaction is very strongly acid in the subsoil and very strongly acid to slightly acid in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings, local roads and streets, and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard and the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIe.

165—Weir silt loam. This nearly level, poorly drained soil is on broad upland flats. It is ponded for brief or long periods from February through June in most years. Individual areas are irregular in shape and range from about 3 to 100 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 5 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 9 inches thick. The subsoil is grayish brown and light brownish gray, mottled silty clay loam about 33 inches thick. The upper part is firm, and the lower part is friable. The substratum to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In some areas the subsoil has more clay in the upper part. In other areas it is not so gray. In places the surface layer is darker.

Included with this soil in mapping are small areas of the moderately well drained Hosmer soils on slight rises on the higher parts of the landscape. These soils make up 1 to 3 percent of the unit.

Air and water move through the Weir soil at a very slow rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below from February through June in most years. Available water capacity is high. Organic matter content is moderately low. Reaction is very strongly acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is cultivated. It is moderately suited to cultivated crops and poorly suited to hay, pasture, and woodland. It is generally unsuitable as a site for dwellings and septic tank absorption fields because of the ponding and the very slow permeability.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain or improve the drainage system are needed. The seasonal high water table delays planting or harvesting in some years. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferment of grazing during wet

periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for local roads and streets, low strength, ponding, and the high potential for frost action are limitations. Replacing the base material with suitable fill material and installing a drainage system help to overcome these limitations.

The land capability classification is IIIw.

214B—Hosmer silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridges in the uplands, mainly in the western half of the county. Individual areas are circular or elongated and range from 3 to 75 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil extends below a depth of 60 inches. In sequence downward, it is yellowish brown, mottled, friable silty clay loam; yellowish brown, mottled, friable silty clay loam that has light gray silt coatings; yellowish brown, mottled, friable silty clay loam; light brownish gray and yellowish brown, mottled, firm, slightly brittle silty clay loam; and yellowish brown and light brownish gray, mottled, friable silt loam. In some areas grayish mottles are higher in the subsoil. In other areas the subsoil has no grayish mottles. In some places it has more clay. In other places it does not have a brittle layer. In a few places it is extremely acid.

Included with this soil in mapping are small areas of the poorly drained Weir soils on the broader ridges and in the lower positions on the landscape. These soils make up 5 to 10 percent of the unit.

Air and water move through the upper part of the Hosmer soil at a moderate rate and through the lower part at a very slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 2.5 to 3.0 feet in March and April of most years. Available water capacity is moderate. Organic matter content is moderately low. The subsoil is very strongly acid. It has a moderate shrink-swell potential. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, pasture, and woodland. It is moderately suited to dwellings and poorly suited to septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion. Returning crop residue to the soil helps to maintain tilth and fertility.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface drains at the base of foundations helps to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, the high potential for frost action is a limitation. Replacing the base material with suitable fill material helps to overcome this limitation.

The land capability classification is IIe.

214C3—Hosmer silty clay loam, 5 to 10 percent slopes, severely eroded. This sloping, moderately well drained soil is on ridges and convex side slopes along upland drainageways. In most areas, erosion has removed nearly all of the original surface layer and tillage has mixed the rest with the upper part of the subsoil. Individual areas are irregular in shape or elongated and range from 5 to 75 acres in size.

Typically, the surface layer is dark yellowish brown, friable silty clay loam about 5 inches thick. The subsoil is mottled silty clay loam about 30 inches thick. The upper part is yellowish brown and firm. The next part is brown and grayish brown, is firm and friable, and is slightly brittle. The lower part is yellowish brown and grayish brown and is friable. The substratum to a depth of 60 inches or more is brown and strong brown, mottled, friable silt loam. In some less eroded areas, the surface layer is silt loam. In places the subsoil is extremely acid.

Included with this soil in mapping are small areas of the somewhat poorly drained Atlas and Blair and well drained Hickory soils on the lower parts of the side slopes. Also included are small areas where shale or sandstone crops out on the lower parts of the slopes. Included areas make up 5 to 10 percent of the unit.

Air and water move through the upper part of the Hosmer soil at a moderate rate and through the lower part at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is at a depth of 2.5 to 3.0 feet in March and April of most years. Available water capacity is moderate. Organic matter content is moderately low. Reaction is medium acid to very strongly acid in the subsoil and very strongly acid to slightly acid in the surface layer. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

In most areas this soil is cultivated. It is poorly suited to cultivated crops and moderately suited to hay, pasture, and woodland. It is moderately suited to dwellings and poorly suited to septic tank absorption fields.

In the areas used for cultivated crops, further erosion is a severe hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface drains at the base of foundations helps to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, the high potential for frost action is a limitation. Replacing the base material with suitable fill material helps to overcome this limitation.

The land capability classification is IVe.

338—Hurst silt loam. This nearly level, somewhat poorly drained soil is on broad stream terraces. It is subject to rare flooding, which lasts for brief periods. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is light gray, mottled, friable silt loam about 7 inches thick. The subsoil is about 34 inches thick. It is mottled and firm. The upper part is brown silty clay, the next part is grayish brown and yellowish brown silty clay, and the lower part is light olive gray silty clay loam. The substratum to a depth of 60 inches or more is grayish brown, mottled, firm silty clay. In some areas the subsoil is not so gray. In other areas it is grayer. In places the surface layer is darker.

Air and water move through the Hurst soil at a very slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from February through April in most years. Available water capacity is high. Organic matter content is moderately low. Reaction generally is strongly acid to extremely acid in the subsoil and varies widely in the surface layer as a result of local liming practices. The shrink-swell potential is high in the subsoil. The potential for frost action is moderate.

In most areas this soil is cultivated. It is moderately suited to cultivated crops, hay, pasture, and woodland. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the flooding and the very slow permeability.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain the drainage system are needed. The seasonal high water table delays planting or harvesting in some years. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for local roads and streets, low strength and the high shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIw.

382—Belknap silt loam. This nearly level, somewhat poorly drained soil is on slight rises on flood plains. It is frequently flooded for brief periods from January through May in most years. Individual areas are irregular in shape or elongated and range from 10 to 500 acres in size.

Typically, the surface layer is brown, mottled silt loam about 9 inches thick. The substratum to a depth of more than 60 inches is grayish brown and brown, mottled, friable silt loam. In some areas the seasonal high water table is below a depth of 3 feet. In other areas the soil is grayer throughout.

Included with this soil in mapping are small areas of the somewhat poorly drained Banlic and poorly drained Karnak soils. Banlic soils are in landscape positions similar to those of the Belknap soil. They have a brittle layer in the subsoil. Karnak soils are in shallow depressions. They have more clay throughout than the Belknap soil. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Belknap soil at a moderately slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from January through June in most years.

Available water capacity is high. Organic matter content is moderate. Reaction is medium acid to very strongly acid in the substratum and very strongly acid to neutral in the surface layer. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, pasture, and woodland. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the flooding.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain the drainage system are needed. Surface drains function satisfactorily if suitable outlets are available. Flooding generally occurs in winter and spring. It occasionally damages crops. Dikes and levees provide protection from flooding. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation and the frequent flooding is a hazard. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for local roads and streets, the flooding and the high potential for frost action are hazards. Protection from flooding is needed. Replacing the base material with suitable fill material helps to prevent the damage caused by frost action.

The land capability classification is IIw.

426—Karnak silty clay. This nearly level, poorly drained soil generally is in the lowest position on flood plains. It is frequently flooded for long periods from March through May in most years (fig. 7). Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown, friable silty clay about 3 inches thick. The subsoil is gray and dark gray, mottled, firm silty clay about 33 inches thick. The substratum to a depth of 60 inches or more is light brownish gray, mottled, firm silty clay. In some areas the surface layer is thicker and darker.

Included with this soil in mapping are small areas of the poorly drained Bonnie and somewhat poorly drained Belknap soils. These soils have less clay throughout than the Karnak soil. They make up 2 to 5 percent of the unit.

Air and water move through the Karnak soil at a very slow or slow rate. Surface runoff is very slow in cultivated areas. The seasonal high water table is within a depth of 3 feet from April through June in most years. Available water capacity is moderate. Organic matter content also is moderate. Reaction is medium acid or strongly acid in the subsoil and medium acid to neutral in the surface layer. The shrink-swell potential and the potential for frost action are high.

Most areas are cultivated. This soil is poorly suited to cultivated crops, hay, and pasture. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the flooding.

In the areas used for corn or soybeans, the flooding is a hazard and the seasonal high water table and moderate available water capacity are limitations. The flooding and the seasonal high water table delay planting in most years. Measures that maintain or improve the drainage system are needed. Surface drains function satisfactorily if suitable outlets are available. Dikes and levees provide protection from flooding. Leaving crop residue on the surface reduces the amount of soil moisture lost through evaporation and thus increases the amount of water available to plants. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation and the frequent flooding is a hazard. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

The land capability classification is IVw.

536—Dumps, mine. This map unit consists of nearly level to very steep deposits of coarse refuse derived from the washing and separation of coal. Individual areas are irregularly shaped or fan shaped and range from 10 to 120 acres in size.

The refuse, commonly called gob, has varying amounts of coal, sandstone, shale, soil material, and pyrite. After weathering, the refuse generally has a concentration of aluminum, zinc, and sulfur that is potentially toxic to most plants. The refuse and small included water areas are extremely acid. In places escarpments are near the water areas and the adjacent natural soils at the edge of the dumps.

Air and water move through the refuse at a moderate to rapid rate. Surface runoff is ponded to slow in the nearly level areas and medium to very rapid in the steeper areas. The runoff water is extremely acid and is toxic to most plants. The material has been compacted and is easily eroded. The nearly level areas are wet in spring, although the depth to the seasonal high water table varies. Organic matter content is very low.

In most areas the refuse supports very little vegetation. A few small areas of included natural soils support cottonwood, wild cherry, and boxelder. The lower slopes near the perimeter of the dumps generally have a partial cover of threeawn, broom sedge, dewberry, and wild rose.

Some areas have been reclaimed. They are covered with about 4 feet of soil material, which provides a growing medium for plants roots. In other areas borrow material is not readily available. In places attempts have been made to establish a permanent plant cover by

Figure 7.—Flooding in an area of Karnak silty clay.

adding lime to the surface of the refuse and then adding 1 or 2 feet of soil before planting or by adding lime to the surface of the refuse and then seeding directly into the refuse. Mulching and using netting help to protect the seedlings as they are becoming established. Grassed waterways and, on the steeper slopes, diversion terraces help to remove surface runoff at a nonerosive velocity. Constructing holding basins and adding lime help to neutralize the acid leachate before it is discharged into streams.

Some areas have limited potential for some recreational uses, such as shooting ranges or paths and trails. The major management concerns are the wetness in the nearly level areas and erosion and toxic runoff in

the steeper areas. Holding ponds keep the toxic runoff from entering drainageways and deep water areas and from running onto cropland. If plants are to be established, grading, land shaping, and a cover of soil material are needed. Onsite investigation is needed to determine the feasibility of reclamation for particular uses.

No land capability classification is assigned.

581B2—Tamalco silt loam, 1 to 5 percent slopes, eroded. This gently sloping, moderately well drained soil is on low mounds, knolls, and ridges in the uplands. It has a high content of exchangeable sodium in the subsoil. Individual areas are circular, elongated, or irregular in shape and range from 5 to 20 acres in size.

Typically, the surface layer is brown and yellowish red silt loam about 6 inches thick. The surface soil has been thinned by erosion. The subsoil is about 40 inches thick. The upper part is strong brown and yellowish red, firm silty clay. The next part is brown and yellowish brown, mottled, firm and friable silty clay loam. The lower part is grayish brown and light brownish gray, mottled, friable silty clay loam and silt loam. The substratum to a depth of 60 inches or more is brown, mottled, friable silt loam. In some areas the subsoil is grayer in the upper part. In other areas the soil is deeper to sodium affected layers.

Included with this soil in mapping are small areas of the somewhat poorly drained Hoyleton and Oconee soils. These soils do not have a high content of sodium in the subsoil. They are lower on the landscape than the Tamalco soil. They make up 2 to 5 percent of the unit.

Air and water move through the Tamalco soil at a very slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is at a depth of 3 to 5 feet from February through April in most years. Available water capacity is moderate. Organic matter content also is moderate. Reaction is very strongly acid to strongly alkaline in the subsoil and varies widely in the surface layer as a result of local liming practices. The high content of sodium in the subsoil reduces the availability and uptake of some plant nutrients and causes plant stress during dry periods. The shrink-swell potential is high in the upper part of the subsoil and moderate in the lower part. The potential for frost action is high.

In most areas this soil is cultivated. It is poorly suited to cultivated crops, hay, and pasture. It is moderately suited to woodland. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard and the high content of sodium is a limitation. Yields of wheat and soybeans are less affected by the content of sodium than are yields of corn. Applying a conservation tillage system, farming on the contour, terracing, and returning crop residue to the soil help to control erosion, minimize crusting, improve tilth, and maintain productivity.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the high shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the shrink-swell potential are limitations. Replacing the base material with suitable fill helps to overcome these limitations.

The land capability classification is IIIe.

787—Banlic silt loam. This nearly level, somewhat poorly drained soil is on low terraces in stream valleys. It is frequently flooded for brief periods from February through April in most years. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown and brown, friable silt loam about 8 inches thick. The subsurface layer is brown, mottled, friable silt loam about 5 inches thick. The subsoil is mottled silt loam about 42 inches thick. The upper part is pale brown and friable, the next part is brown and is firm and brittle, and the lower part is light brownish gray and friable. The substratum to a depth of 60 inches or more is light brownish gray and yellowish brown, mottled, friable silt loam.

Included with this soil in mapping are small areas of Belknap soils and the poorly drained Bonnie soils. Both of the included soils are in low areas on flood plains. They do not have a brittle layer. They make up about 5 percent of the unit.

Air and water move through the Banlic soil at a slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is at a depth of 1 to 3 feet from January through June in most years. Available water capacity is moderate. Organic matter content is low. The subsoil is dominantly medium to very strongly acid. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is cultivated. It is well suited to cultivated crops, hay, pasture, and woodland. It generally

is unsuitable as a site for dwellings and septic tank absorption fields because of the flooding and the slow permeability.

A drainage system has been installed in the areas used for cultivated crops. Measures that maintain the drainage system are needed. The seasonal high water table or the flooding delays planting in some years. The flooding generally occurs in winter and spring. It occasionally damages crops. It can be controlled by dikes and levees. Surface drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for hay and pasture, the seasonal high water table is a limitation and the frequent flooding is a hazard. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

The land capability classification is IIw.

802B—Orthents, loamy, undulating. These nearly level to sloping, somewhat poorly drained to well drained soils are in cut and filled areas, in borrow areas, and in surface mined-areas. The landscape has been modified by construction at work sites. Areas where surface mining is active include cast overburden, which is a mixture of loess, glacial till, and bedrock. Individual areas are rectangular or irregular in shape and range from 10 to 160 acres in size.

In a typical cut area, the surface layer is mixed brown, yellowish brown, and light brownish gray silt loam about 6 inches thick. The substratum to a depth of 60 inches or more is pale brown and light brownish gray, mottled silty clay loam. In a typical filled area, the surface layer is about 10 inches of dark grayish brown, mottled silt loam and silty clay loam. The substratum to a depth of 60 inches or more is light brownish gray and gray, mottled, friable to very firm silt loam, silty clay loam, loam, and clay loam. In some cut areas layers of the natural soil are at the surface.

Included with these soils in mapping are small areas where buildings, roads, railroads, parking lots, or storage facilities cover as much as 65 percent of the surface. Also included are steep sidewalls; a few areas that have a high content of rock fragments; areas that have cinders, bricks, or other debris; and stockpiles of coal.

Air and water move through the Orthents at a very slow to moderate rate, depending on the texture and the extent to which the soil material has been compacted or scraped by construction equipment. Available water capacity generally is moderate or low, but it varies. Organic matter content and fertility are generally low.

Most of the acreage is idle land or is used for nonfarm purposes. The plant cover ranges from poor in newly scraped areas to good in some stabilized areas. The erosion hazard is severe in areas that are not protected by a plant cover. Onsite investigation is needed to determine the limitations or hazards that affect land uses in specific areas.

No land capability classification is assigned.

821G—Morristown cobbly silty clay loam, 20 to 60 percent slopes, very stony. This steep, well drained soil is on the crest, sides, and troughs of spoil banks in areas that formerly were surface mined. The ridge crests have been leveled and are about 50 to 70 feet wide. The side slopes are short and have a relief of about 20 to 50 feet. The terrain is ragged because of the repeating pattern of crests, side slopes, and troughs. Many scattered stones and boulders are on and below the surface. Individual areas are circular and range from 10 to 1,000 acres in size.

Typically, the surface layer is yellowish brown, friable cobbly silty clay loam about 2 inches thick. The substratum extends below a depth of 60 inches. It is mottled and friable. The upper part is yellowish brown cobbly clay loam, and the lower part is brownish yellow very bouldery clay loam. In some areas the soil has fewer rock fragments. In other areas the slope is less than 20 percent.

Included with this soil in mapping are small ponds and haulage roads. Also included are small areas that have acid-producing pyrite material in the surface layer. Included areas make up 5 to 10 percent of the unit.

Air and water move through the Morristown soil at a moderately slow rate. Surface runoff is rapid. Available water capacity is low. Organic matter content is very low. This soil generally is calcareous to a depth of 20 inches. In some areas, however, it has acid pockets or layers below that depth. The coarse fragments restrict root growth. The shrink-swell potential and the potential for frost action are moderate.

Grasses, patches of wild sunflowers, various weeds, scrub trees, and brush grow naturally on this soil. Small stands of cottonwood trees are in some troughs and in depressional areas on ridges. Some areas have been planted to black locust, sweetgum, silver maple, and loblolly pine. The soil is suited to grasses and some trees, to scenic trails, and to habitat for openland wildlife. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the slope.

In areas used for pasture, erosion is a serious hazard. Also, establishing pasture on these steep slopes is very difficult. The surface stoniness restricts the use of most machinery. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing and timely deferment of grazing help to keep the pasture in good condition and help to control erosion.

In areas used as habitat for wildlife, adequate stands of herbaceous cover can be established. The slope and

low fertility, however, limit the extent of growing grain and seed crops. The less sloping included or adjacent areas on the crest of the ridges are suitable for these crops. Protection from fire and grazing is essential.

The land capability classification is VIIe.

823B—Schuline silt loam, 1 to 5 percent slopes. This gently undulating, well drained soil is in areas of graded cast overburden. At least 4 feet of soil material has been replaced by a variety of means, including scrapers, bucket wheel systems, and bucket wheel and belt systems. In most areas bulldozers were used for the final grading. Individual areas are generally circular or rectangular and range from 50 to 200 acres in size.

Typically, the surface layer is mixed brown and yellowish brown, friable silt loam about 6 inches thick. The subsurface layer is mixed brown, yellowish brown, and gray, firm silt loam about 4 inches thick. The substratum extends below a depth of 60 inches. It is mixed light yellowish brown, yellowish brown, brown, brownish yellow, gray, and light brownish gray, firm loam. In some areas the surface layer is more than 10 inches thick. In other areas the topsoil has not been replaced. In some places the soil has less sand throughout. In other places it has a higher content of coarse fragments throughout.

Included with this soil in mapping are small areas of the well drained Morristown soils. These soils are in the less recently mined areas and on slopes in pits made by the final cut. The content of rock fragments is more than 35 percent throughout these soils. Also included are soils in small depressions that are subject to ponding and that formed through differential settling. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Schuline soil at a moderately slow or slow rate. Surface runoff is slow or medium. Available water capacity is high. Organic matter content is low or moderately low. Reaction generally is mildly alkaline or moderately alkaline, but some layers are medium acid. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used for cultivated crops or for hay or pasture. It is moderately suited to corn, soybeans, and small grain. It is well suited to hay and pasture. It is moderately suited to dwellings and poorly suited to septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil helps to maintain tilth and fertility. Crops grow best in areas where compaction has been kept to a minimum.

In the areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the shrink-swell potential is a limitation. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the moderately slow or slow permeability is a limitation. Enlarging the absorption field or installing a sealed sand filter and a disinfection tank helps to overcome this limitation.

The land capability classification is IIe.

823C—Schuline silt loam, 5 to 10 percent slopes. This gently rolling, well drained soil is in areas of graded cast overburden. At least 4 feet of soil material has been replaced by a variety of means, including scrapers, bucket wheel systems, and draglines. In most areas the final grading was done by a bulldozer. Individual areas are generally circular or rectangular and range from about 25 to 200 acres in size.

Typically, the surface layer is mixed very dark grayish brown, yellowish brown, and dark grayish brown, friable silt loam about 9 inches thick. The next layer is mixed dark yellowish brown and dark grayish brown, mottled, firm silty clay loam about 4 inches thick. The substratum to a depth of 60 inches or more is yellowish brown, mottled, firm clay loam. In places the topsoil has not been replaced. In some areas the soil has less sand throughout. In other areas it has a higher content of coarse fragments throughout.

Included with this soil in mapping are small areas of the well drained Morristown soils, in which the content of rock fragments is more than 35 percent throughout. These soils are in the less recently mined areas and on slopes in pits made by the final cut. They make up 2 to 5 percent of the unit.

Air and water move through the Schuline soil at a moderately slow or slow rate. Surface runoff is medium. Available water capacity is high. Organic matter content is low or moderately low. Reaction generally is mildly alkaline or moderately alkaline, but some layers are medium acid. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used for cultivated crops, hay, or pasture. It is moderately suited to corn, soybeans, and small grain. It is well suited to hay and pasture. It is moderately suited to dwellings and poorly suited to septic tank absorption fields.

In the areas used for cultivated crops, erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil

or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake. Crops grow best in areas where compaction has been kept to a minimum.

In the areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the shrink-swell potential is a limitation. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the slow or moderately slow permeability is a limitation. Enlarging the absorption field or installing a sealed sand filter and a disinfection tank helps to overcome this limitation.

The land capability classification is IIIe.

823D—Schuline silt loam, 10 to 15 percent slopes. This rolling, well drained soil is in areas of graded cast overburden. At least 4 feet of soil material has been replaced by a variety of means, including scrapers, bucket wheel systems, and draglines. In most areas the final grading was done by a bulldozer. Individual areas are generally circular or rectangular and range from 25 to about 200 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The substratum to a depth of 60 inches or more is olive brown, mottled, very firm clay loam. In places the topsoil has not been replaced. In some areas the soil has less sand throughout. In other areas it has a higher content of coarse fragments throughout.

Included with this soil in mapping are small areas of the well drained Morristown soils, in which the content of rock fragments is more than 35 percent throughout. These soils are in the less recently mined areas and on slopes in pits made by the final cut. They make up 2 to 5 percent of the unit.

Air and water move through the Schuline soil at a moderately slow or slow rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is low or moderately low. Reaction generally is mildly alkaline or moderately alkaline, but some layers are medium acid. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used for cultivated crops, hay, or pasture. It is poorly suited to corn, soybeans, and small grain. It is moderately suited to hay and pasture. It is poorly suited to dwellings and septic tank absorption fields.

In the areas used for cultivated crops, erosion is a severe hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake. Crops grow best in areas where compaction has been kept to a minimum.

In the areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the shrink-swell potential and the slope are limitations. Foundations should be designed so that they can withstand the shrink-swell movement of the soil. Cutting and filling help to overcome the slope.

In areas used as sites for septic tank absorption fields, the moderately slow or slow permeability and the slope are limitations. Enlarging the absorption field or installing a sealed sand filter and a disinfection tank helps to overcome the restricted permeability. Laying out the filter lines on the contour helps to overcome the slope.

The land capability classification is IIIe.

824B—Swanwick silt loam, 1 to 5 percent slopes. This gently undulating, moderately well drained soil is in areas of graded cast overburden. At least 4 feet of soil material has been replaced by pan scrapers. In most areas the final grading has been done by a bulldozer. Individual areas generally are circular or rectangular and range from 50 to 200 acres in size.

Typically, the surface layer is mixed brown and dark yellowish brown, friable silt loam about 10 inches thick. The upper part of the substratum is brown and yellowish brown, friable silt loam. The lower part to a depth of 60 inches or more is light brownish gray, light gray, grayish brown, and yellowish brown, mottled, firm silty clay loam. In some areas the soil has more sand throughout. In other areas the surface layer is thinner.

Included with this soil in mapping are small areas of the well drained Lenzburg and Morristown soils. These soils have a higher content of rock fragments throughout than the Swanwick soil. They are in the more recently mined areas and on slopes in pits made by the final cut. Also included are soils in depressions that are subject to ponding and that formed through differential settling of

the fill material. Included soils make up 2 to 5 percent of the unit.

Air and water move through the Swanwick soil at a very slow rate. Surface runoff is slow or medium. The seasonal high water table is at a depth of 4 to 6 feet from February through April in most years. Available water capacity is moderate or high. Organic matter content is low. Reaction is dominantly medium acid to moderately alkaline but is very strongly acid in some layers. The shrink-swell potential is moderate. The potential for frost action is high.

In most areas this soil is used for cultivated crops or for hay and pasture. It is moderately suited to corn, soybeans, and small grain. It is well suited to hay and pasture. It is moderately suited to dwellings and poorly suited to septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil helps to maintain tilth and fertility. Crops grow best in areas where compaction has been kept to a minimum.

In the areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the shrink-swell potential is a limitation. The seasonal high water table is an additional limitation on sites for dwellings with basements. Foundations should be designed so that they can withstand the shrink-swell movement of the soil. Installing subsurface drains at the base of the foundations helps to overcome the wetness.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, the high potential for frost action and low strength are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIe.

825C—Lenzburg silty clay loam, acid substratum, 2 to 12 percent slopes. This sloping, well drained soil is on the crest and sides of mounds in areas that formerly were surface mined. The gob material in these areas has been covered with at least 4 feet of soil material. Individual areas are rectangular or irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is grayish brown and brown, very firm silty clay loam about 9 inches thick. Below this are layers of grayish brown and brown, mottled, friable silty clay loam and dark grayish brown and dark yellowish brown, very firm silty clay loam. The material below a depth of about 55 inches is an extremely acid mixture of coal, fireclay, and claystone.

Included with this soil in mapping are small areas where the overlying soil material is thinner, areas where no soil material has been replaced, and areas where the slope is more than 12 percent. Included areas make up 2 to 10 percent of the unit.

Air and water move through the upper part of the Lenzburg soil at a moderately slow rate and through the lower part at a moderately rapid rate. Surface runoff is medium or rapid. Available water capacity is low. Organic matter content also is low. Reaction is neutral to moderately alkaline to a depth of at least 40 inches. The substratum is extremely acid. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used for pasture or hay. It is moderately suited to pasture, hay, cultivated crops, and woodland. It is poorly suited to dwellings and septic tank absorption fields.

In areas used for cultivated crops, erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

In the areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the acid substratum material has a highly corrosive effect on concrete. As a result, special cement and special methods of manufacturing concrete are needed.

In areas used as sites for septic tank absorption fields, the moderately slow permeability is a limitation. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome this limitation. An aerobic waste disposal system is an alternative.

The land capability classification is IIIe.

850D3—Hickory-Hosmer silty clay loams, 10 to 18 percent slopes, severely eroded. These strongly sloping, well drained and moderately well drained soils

are on side slopes along drainageways on strongly dissected uplands. The Hosmer soil is on the upper part of the slopes, and the Hickory soil is on the lower part. In most areas, nearly all of the original surface layer has been removed by erosion and the rest has been mixed with the upper part of the subsoil. Individual areas are elongated or irregular in shape and range from about 3 to 50 acres in size. They are about 45 to 65 percent Hickory soil and 35 to 55 percent Hosmer soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

Typically, the Hickory soil has a surface layer of brown and yellowish brown, friable silty clay loam about 8 inches thick. The subsoil to a depth of more than 60 inches is mottled, firm clay loam. The upper part is yellowish brown, and the lower part is yellowish brown and light brownish gray. In some areas the subsoil has more clay.

Typically, the Hosmer soil has a surface layer of yellowish brown and brown, friable silty clay loam about 6 inches thick. The subsoil extends below a depth of 60 inches. The upper part is brown and dark yellowish brown, mottled, friable silt loam. The next part is yellowish brown, mottled, firm, slightly brittle silty clay loam. The lower part is light yellowish brown, mottled, firm silt loam.

Included with these soils in mapping are small areas of the somewhat poorly drained Blair soils on side slopes at the end of drainageways. Also included are areas where shale and sandstone bedrock crop out on the lower part of the slopes. Included areas make up 5 to 10 percent of the unit.

Air and water move through the Hickory soil at a moderate rate. They move through the the upper part of the Hosmer soil at a moderate rate and through the lower part at a very slow rate. Hosmer soil has a seasonal high water table at a depth of 2.5 to 3.0 feet in March and April during most years. Available water capacity is high in the Hickory soil and moderate in the Hosmer soil. Surface runoff is rapid on both soils. Organic matter content is low. Reaction is dominantly medium acid to very strongly acid in the subsoil and varies in the surface layer because of local liming practices. The shrink-swell potential is moderate. The potential for frost action is moderate in the Hickory soil and high in the Hosmer soil.

In most areas these soils are cultivated. They are generally unsuited to cultivated crops because of the erosion hazard (fig. 8). A permanent cover of pasture plants or trees is needed. The soils are poorly suited to hay and moderately suited to pasture and woodland. They are poorly suited to dwellings and septic tank absorption fields.

In areas used as pasture, further erosion is a severe hazard, especially during periods when the pasture is becoming established. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Windthrow is a hazard on the Hosmer soil. Plant competition also is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Applying harvesting methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to prevent windthrow. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as sites for dwellings, the seasonal high water table in the Hosmer soil and the shrink-swell potential and slope of both soils are limitations. A drainage system helps to lower the seasonal high water table. Foundations should be designed so that they can withstand the shrink-swell movement of the soil. Cutting and filling help to overcome the slope.

In areas used as sites for septic tank absorption fields, the seasonal high water table in the Hosmer soil and the restricted permeability and slope of both soils are limitations. Underground drains help to lower the seasonal high water table. Land leveling is needed. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome the restricted permeability. An aerobic water disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is VIe.

866—Dumps, slurry. This map unit occurs as nearly level areas of loamy refuse material that has settled out from slurry derived from coal preparation plants. The slurry is pumped into a pond or into a box cut. Pumping continues until mining activities have ceased or until the pond or box cut is filled. In most areas the material then undergoes oxidation for several years and becomes strongly acid to extremely acid. Individual areas are

Figure 8.—Erosion in a cultivated area of Hickory-Hosmer silty clay loams, 10 to 18 percent slopes, severely eroded.

mainly rectangular or long and narrow and range from 8 to 100 acres in size.

Typically, the surface layer is about 2 inches of black loam. The underlying material to a depth of 60 inches or more is black, mottled, friable sandy loam.

Included in this unit in mapping are small levees constructed to contain the slurry. Also included are a few areas of coarse gob refuse. Included areas make up 5 to 10 percent of the unit.

Air and water move through the slurry material at a moderately rapid rate. Surface runoff is ponded. Reaction ranges from neutral to extremely acid, depending on the site and the state of oxidation. The content of carbonaceous material, mainly impure waste coal, is high. Unless a drainage system is installed, the water table is commonly at or above the surface. The root zone generally is shallow. Because of a uniformity of particle sizes and a lack of cohesiveness, the surface layer is unstable and highly susceptible to soil blowing and water erosion. Soil blowing can damage young plants. Leachate commonly inhibits the growth of plants. Cutting of a levee by wave action and the possibility of levee breaks are hazards. Riprap helps to control the cutting by wave action.

Most areas are used for slurry storage. This unit is generally unsuited to other uses. Coal can be mined in a few areas. In some areas, lime has been added to neutralize the slickens in the surface layer and 1 or 2 feet of soil material has been added as a growing medium for roots. In places reedgrass has been established.

No land capability classification is assigned.

871B—Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony. This undulating, well drained soil is in areas of graded cast overburden derived from surface mining activities. Scattered stones and boulders are common on and below the surface. Individual areas are circular and range from 50 to about 200 acres in size.

Typically, the surface layer is dark grayish brown, friable gravelly silty clay loam about 3 inches thick. The substratum to a depth of 60 inches or more is mixed gray, grayish brown, and light brownish gray, mottled, firm gravelly silty clay loam. Coal, shale, and sandstone fragments 1 to 6 inches in diameter are throughout the profile. In some areas the soil has fewer rock fragments throughout.

Included with this soil in the mapping are small areas of depressional soils that are subject to ponding. Also included are areas of soils that have a higher content of coarse fragments than the Lenzburg soil. Included soils make up 5 to 10 percent of the unit.

Air and water move through the Lenzburg soil at a moderately slow rate. Surface runoff is slow or medium. Available water capacity is moderate. Organic matter content is low. This soil generally is calcareous throughout. The coarse fragments restrict root growth. The shrink-swell potential is high. The potential for frost action is moderate.

In most areas this soil is used as pasture. It is moderately suited to hay and pasture and to dwellings. It is poorly suited to septic tank absorption fields. It generally is unsuited to cultivated crops because of the stony surface layer.

In the areas used for hay or pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion. The stoniness restricts the use of some machinery.

In areas used as sites for dwellings, the shrink-swell potential is a limitation. Foundations should be designed so that they can withstand the shrink-swell movement of the soil.

In areas used as sites for septic tank absorption fields, the moderately slow permeability is a limitation. Enlarging the absorption field or installing a sealed sand filter and a disinfection tank helps to overcome this limitation.

The land capability classification is VIe.

871D—Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony. This rolling, well drained soil is in areas of graded cast overburden derived from surface mining activities. Scattered rock fragments are common on and below the surface. Individual areas are circular or irregular in shape and range from 50 to 500 acres in size.

Typically, the surface layer is mixed dark grayish brown and yellowish brown, friable gravelly silty clay loam about 2 inches thick. The substratum to a depth of 60 inches or more is yellowish brown and grayish brown gravelly clay loam. The upper part is friable, and the lower part is firm. Rock fragments make up approximately 20 percent of the volume of this soil. Gravel-size rock fragments make up about 10 percent of the volume, cobble-size rock fragments about 7 percent, and stone-size rock fragments about 3 percent. A few boulders are in the more sloping areas. In some areas the soil has fewer rock fragments throughout. In other areas the slope is less than 7 or more than 20 percent.

Included with this soil in mapping are small areas of Morristown soils, in which the content of rock fragments is more than 35 percent. These soils make up about 5 percent of the unit.

Air and water move through the Lenzburg soil at a moderately slow rate. Surface runoff is medium or rapid. Available water capacity is moderate. Organic matter content is low. This soil generally is calcareous throughout. In some areas, however, it has scattered pockets of acid material throughout. The coarse fragments restrict root growth. The shrink-swell potential is high. The potential for frost action is moderate.

In most areas this soil is used as pasture or woodland. It is moderately suited to pasture and well suited to woodland and to habitat for woodland wildlife. It is poorly suited to dwellings and septic tank absorption fields. It generally is unsuited to cultivated crops because of the stoniness.

In the areas used for hay or pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Overgrazing reduces forage yields and causes surface compaction, excessive runoff, and erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion. The stoniness restricts the use of some machinery.

In the areas used as woodland, plant competition is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as habitat for wildlife, adequate stands of herbaceous cover can be maintained. The slope and the stoniness, however, limit the extent of grain and seed crops. Protection from fire and grazing is essential.

In areas used as sites for dwellings, the shrink-swell potential and the slope are limitations. Foundations

should be designed so that they can withstand the shrink-swell movement of the soil. Cutting and filling help to overcome the slope.

In areas used as sites for septic tank absorption fields, the moderately slow permeability and the slope are limitations. Enlarging the absorption field or installing a sealed sand filter and a disinfection tank helps to overcome the restricted permeability. Laying out the absorption field on the contour helps to overcome the slope.

The land capability classification is VIe.

871G—Lenzburg gravelly silty clay loam, 20 to 60 percent slopes, stony. This steep, well drained soil is on the crest, sides, and troughs of spoil banks in areas that formerly were surface mined. The ridge crests have been leveled and are about 50 to 70 feet wide. The side slopes are short and have a relief of about 5 to 25 feet. The terrain is rugged because of the repeating pattern of crests, side slopes, and troughs. Scattered stones and boulders are on and below the surface. Individual areas are circular and range from about 200 to 1,000 acres in size.

Typically, the surface layer is mixed very dark gray and dark yellowish brown, friable gravelly silty clay loam about 3 inches thick. The substratum extends to a depth of more than 60 inches. It is mottled and firm. The upper part is mixed gray and yellowish brown silty clay loam. The next part is mixed brown and yellowish brown silty clay loam. The lower part is mixed yellowish brown and gray gravelly silty clay loam. Coal, shale, and sandstone fragments 1 to 6 inches in diameter are on and below the surface. In places the content of rock fragments is less than 15 percent throughout the profile. In some areas on narrow ridges and in troughs, the slope is less than 20 percent.

Included with this soil in mapping are small areas of Morristown soils, in which the content of rock fragments is more than 35 percent. These soils are in positions on the landscape similar to those of the Lenzberg soil. They make up about 5 to 10 percent of the unit.

Air and water move through the Lenzburg soil at a moderately slow rate. Surface runoff is medium or rapid. Available water capacity is moderate. Organic matter content is low. This soil generally is calcareous throughout. In some areas, however, it has scattered pockets of acid material throughout. The coarse fragments restrict root growth. The shrink-swell potential is high. The potential for frost action is moderate.

In most areas this soil is used as woodland or pasture. It is moderately suited to woodland and well suited to habitat for woodland wildlife. It generally is unsuited to cultivated crops, hay, pasture, dwellings, and septic tank absorption fields because of the slope and the stoniness.

In the areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Plant competition also is a concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as habitat for wildlife, adequate stands of herbaceous cover can be established. The slope, the stoniness, and low fertility, however, limit the extent of grain and seed crops. The less sloping included or adjacent areas are suitable for these crops. Protection from fire and grazing is essential.

The land capability classification is VIIe.

900E—Hickory-Wellston silt loams, 18 to 30 percent slopes. These moderately steep soils are on side slopes along the major drainageways on strongly dissected uplands. The moderately well drained Hickory soil is on the upper part of the slopes, and the well drained Wellston soil is on the lower part. Individual areas are elongated or irregular in shape and range from 3 to 50 acres in size. They are about 45 to 65 percent Hickory soil and 35 to 55 percent Wellston soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the Hickory soil has a surface layer of black, friable silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable loam about 6 inches thick. The subsoil extends below a depth of 60 inches. It is yellowish brown and mottled. The upper part is friable clay loam, the next part is firm and very firm clay loam, and the lower part is firm sandy loam. In places the lower part of the subsoil has fragments of weathered shale and sandstone.

Typically, the Wellston soil has a surface layer of very dark grayish brown, friable silt loam about 4 inches thick. The subsoil is about 42 inches thick. It is yellowish brown, mottled, and firm. The upper part is silty clay loam, and the lower part is clay loam and silty clay loam. Soft, weathered shale and sandstone bedrock is below a depth of about 46 inches. In places the depth to bedrock is less than 40 inches.

Included with these soils in mapping are small areas where outcrops and escarpments of shale and sandstone are at the base of the slopes along drainageways. The bedrock in these areas has been exposed by the cutting action of streams. Also included are areas of Ava, Blair, and Hosmer soils. Ava and Hosmer soils have a brittle layer in the subsoil. They are on the upper part of the slopes, near the ridge crest. The

somewhat poorly drained Blair soils are on the less sloping side slopes above the Hickory soil. Included areas make up about 5 to 10 percent of the unit.

Air and water move through the Hickory and Wellston soils at a moderate rate. Surface runoff is rapid. Available water capacity is high in the Hickory soil and low in the Wellston soil. Reaction is very strongly acid to neutral in the subsoil of the Hickory soil and very strongly acid to mildly alkaline in the subsoil of the Wellston soil. The shrink-swell potential is moderate in the Hickory soil. The soft, weathered bedrock within a depth of 60 inches in the Wellston soil restricts root growth.

In most areas these soils are wooded. They are well suited to woodland and to habitat for woodland wildlife. They generally are unsuited to cultivated crops because of the erosion hazard. They are moderately suited to hay and pasture. They generally are unsuited to dwellings and septic tank absorption fields because of the slope.

In areas used as pasture, erosion is a serious hazard. Also, establishing pasture on these moderately steep slopes is difficult. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In the areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Windthrow is a hazard on the Hosmer soil. Plant competition also is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Applying harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to prevent windthrow. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

The land capability classification is VIe.

900E3—Wellston-Hickory silty clay loams, 18 to 30 percent slopes, severely eroded. These moderately steep, well drained soils are on side slopes along drainageways on strongly dissected uplands. The Wellston soil is on the lower part of the slopes, and the Hickory soil is on the upper part. In most areas, nearly all the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas are elongated and narrow and range from 2 to 35 acres in size. They are about 55 to 75 percent Wellston soil and 25 to 45 percent Hickory soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Wellston soil is dark yellowish brown and brown, friable silty clay loam about 7 inches thick. The subsoil is yellowish brown, mottled, friable clay loam about 31 inches thick. Soft, weathered bedrock of light brownish gray shale and strong brown sandstone is at a depth of about 38 inches. Hard, unweathered bedrock is commonly at a depth of more than 60 inches. In places it is within a depth of 40 inches.

Typically, the surface layer of the Hickory soil is dark yellowish brown and dark brown, friable silty clay loam about 7 inches thick. The subsoil extends below a depth of 60 inches. The upper part is brown and yellowish brown, mottled, friable silty clay loam; the next part is strong brown, mottled, friable clay loam; and the lower part is yellowish brown and strong brown, mottled, firm clay loam. In some areas the surface layer is clay loam. In other areas grayish mottles are in the middle and lower parts of the subsoil.

Included with these soils in mapping are small areas where outcrops and escarpments of shale and sandstone are along drainageways. The bedrock in these areas has been exposed by the cutting action of streams. Also included are areas of Ava and Hosmer soils on the upper part of the slopes, near the ridge crest. These soils have a brittle layer in the subsoil. Included areas make up about 5 to 10 percent of the unit.

Air and water move through the Wellston and Hickory soils at a moderate rate. Surface runoff is rapid. Available water capacity is low in the Wellston soil and high in the Hickory soil. Reaction is very strongly acid to mildly alkaline in the subsoil of the Wellston soil and very strongly acid to neutral in the subsoil of the Hickory soil. The shrink-swell potential is moderate in the Hickory soil. The soft, weathered bedrock within a depth of 60 inches in the Wellston soil restricts root growth.

In most areas these soils are used as pasture. They generally are unsuited to cultivated crops and hay because of the erosion hazard. They are poorly suited to pasture and well suited to woodland. They generally are unsuited to dwellings and septic tank absorption fields because of the slope.

In the areas used as pasture, further erosion is a serious hazard. Also, renovating or establishing pasture on these moderately steep slopes is difficult. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and

applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Plant competition also is a concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

The land capability classification is VIIe.

900G—Wellston-Hickory silt loams, 30 to 60 percent slopes. These steep, well drained soils are on short side slopes along drainageways on strongly dissected uplands. Individual areas are elongated and narrow and range from 3 to 50 acres in size. They are about 55 to 75 percent Wellston soil and 25 to 45 percent Hickory soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Wellston soil is dark brown and brown, friable silt loam about 4 inches thick. The subsoil is about 33 inches thick. The upper part is dark brown and brown, mottled, friable silt loam; the next part is yellowish brown, mottled, firm clay loam; and the lower part is light yellowish brown and brownish yellow, mottled, firm silty clay loam. Soft, weathered bedrock of light olive brown and light olive gray shale and strong brown sandstone is at a depth of about 37 inches. Hard, unweathered bedrock generally is below a depth of 6 feet. In some areas it is within a depth of 40 inches.

Typically, the surface layer of the Hickory soil is brown, friable silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil extends below a depth of 60 inches. The upper part is strong brown, friable silty clay loam; the next part is yellowish brown, mottled, firm clay loam; and the lower part is brownish yellow, firm clay loam.

Included with these soils in mapping are small areas where outcrops of shale and sandstone generally are on the lower slopes and shale escarpments are along drainageways. The bedrock in these areas has been exposed by the cutting action of streams. Also included are small areas of Ava and Hosmer soils on the upper part of the slopes, near the ridge crest. Ava and Hosmer soils have a brittle layer in the subsoil. Included areas make up about 10 percent of the unit.

Air and water move through the Wellston and Hickory soils at a moderate rate. Surface runoff is rapid. Available water capacity is low in the Wellston soil and high in the Hickory soil. Reaction is very strongly acid to mildly alkaline in the subsoil of the Wellston soil and very strongly acid to medium acid in the subsoil of the Hickory soil. The soft, weathered bedrock within a depth of 60 inches in the Wellston soil restricts root growth. The shrink-swell potential is moderate in the Hickory soil.

In most areas these soils are used as woodland. They generally are unsuited to cultivated crops, hay, and pasture because of the erosion hazard. They are moderately suited to woodland and well suited to habitat for woodland wildlife. They generally are unsuited to dwellings and septic tank absorption fields because of the slope.

In the areas used as woodland, the erosion hazard and the equipment limitation are management concerns because of the slope. Plant competition also is a concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour and seeding bare areas to grass or to a grass-legume mixture after logging activities are completed help to control erosion. Firebreaks should be the grass type. Skidding logs or trees uphill with a cable and winch helps to overcome the slope. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as habitat for woodland wildlife, adequate stands of herbaceous cover can be established. The slope and low fertility, however, limit the extent of grain and seed crops. The less sloping included or adjacent areas are suitable for these crops. Protection from fire and grazing is essential.

The land capability classification is VIIe.

912A—Hoyleton-Darmstadt silt loams, 0 to 2 percent slopes. These nearly level, somewhat poorly drained soils are on broad ridges in the uplands. Individual areas are irregular in shape and range from about 5 to 150 acres in size. They are about 50 to 75 percent Hoyleton soil and 25 to 50 percent Darmstadt soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Hoyleton soil is dark brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 35 inches thick. The upper part is brown, mottled, firm silty clay that has light gray silt coatings, and the lower part is pale brown and light brownish gray, mottled, firm silty clay loam. The substratum to a depth of 60 inches or more is grayish brown, mottled, friable silty loam. In some areas the surface layer is not so dark.

Typically, the surface layer of the Darmstadt soil is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown and light brownish gray, friable silt loam about 10 inches thick. The subsoil extends below a depth of 60 inches. The upper part is pale brown and light brownish gray, mottled, firm silty clay loam, and the lower part is light brownish gray, mottled, friable silt loam. In some areas the surface layer is darker.

Included with these soils in mapping are small areas of the moderately well drained Tamalco and poorly drained Cisne and Huey soils. Tamalco soils are on the slightly higher ridges and knolls. Cisne and Huey soils are in the slightly lower positions on the landscape. Also included are soils in circular mine sinks, which are 0.5 acre to 2.0 acres in size and 2 to 8 feet deep and are subject to ponding. Included soils make up 5 to 20 percent of the unit.

Air and water move through the Hoyleton soil at a slow rate and through the Darmstadt soil at a very slow rate. Surface runoff is slow in cultivated areas of both soils. The seasonal high water table is at a depth of 1 to 3 feet from February through June in most years. Available water capacity is high in the Hoyleton soil and moderate in the Darmstadt soil. Organic matter content is moderate in both soils. Reaction is very strongly acid to slightly acid in the subsoil of the Hoyleton soil. It is very strongly acid in the upper part of the subsoil in the Darmstadt soil and mildly alkaline to strongly alkaline in the lower part. The alkalinity results from a high content of exchangeable sodium. The shrink-swell potential is high in the upper part of the subsoil in the Hoyleton soil and moderate in the lower part. It is moderate in the upper part of the subsoil in the Darmstadt soil and low in the lower part. The potential for frost action is high in both soils.

In most areas these soils are cultivated. They are moderately suited to cultivated crops, hay, pasture, and woodland. They are poorly suited to dwellings and septic tank absorption fields. In some areas, especially southwest of DuQuoin, mine sinks are clustered. These areas may be unsuited to cultivated crops and to dwellings and septic tank absorption fields. Onsite investigation is needed to determine the land capability classification in these areas.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting or harvesting in some years. Shallow surface ditches help to remove excess surface water. The high content of exchangeable sodium in the subsoil of the Darmstadt soil reduces the availability and the uptake of some plant nutrients and causes plant stress in most years. Soybean and wheat yields are less affected by the high content of sodium than are corn yields. A conservation tillage system and crop residue management improve tilth and minimize crusting.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soils.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the slow or very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIw.

912B2—Darmstadt-Hoyleton silt loams, 2 to 6 percent slopes, eroded. These gently sloping, somewhat poorly drained soils are on side slopes along drainageways and on the sides of mounds, knolls, and ridges in the uplands. Individual areas generally are elongated or irregular in shape and range from 3 to 40 acres in size. They are about 50 to 75 percent Darmstadt soil and 25 to 50 percent Hoyleton soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Darmstadt soil is dark brown, friable silt loam about 7 inches thick. The surface soil has been thinned by erosion. The subsoil extends below a depth of 60 inches. In sequence downward, it is dark yellowish brown, mottled, friable silty clay loam; yellowish brown, mottled, firm silty clay; grayish brown and yellowish brown, mottled, firm silty clay loam; and light brownish gray, dark grayish brown, and grayish brown, mottled, friable silt loam.

Typically, the surface layer of the Hoyleton soil is very dark grayish brown and yellowish brown, friable silt loam about 7 inches thick. The surface soil has been thinned by erosion. The subsoil extends below a depth of 60 inches. The upper part is pale brown and yellowish brown, mottled, firm silty clay loam. The next part is strong brown and grayish brown, mottled, firm silty clay loam. The lower part is grayish brown, mottled, friable silt loam. In some places the surface layer is lighter in color. In other places the soil is uneroded. In some of the more severely eroded areas, the surface layer is silty clay loam.

Included with these soils in mapping are small areas of the somewhat poorly drained Blair soils on the more sloping parts of the landscape and the moderately well drained Richview and Tamalco soils in the slightly higher positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Air and water move through the Darmstadt soil at a very slow rate and through the Hoyleton soil at a slow rate. Surface runoff is medium in cultivated areas of both soils. The seasonal high water table is at a depth of 1 to 3 feet from February through June in most years. Available water capacity is moderate in the Darmstadt soil and high in the Hoyleton soil. Organic matter content is moderate in both soils. Reaction is medium acid to moderately alkaline in the subsoil of the Darmstadt soil and very strongly acid to neutral in the subsoil of the Hoyleton soil. The surface layer of both soils is slightly acid or neutral. The shrink-swell potential is moderate in the upper part of the subsoil in the Darmstadt soil and low in the lower part. It is high in the upper part of the subsoil in the Hoyleton soil and moderate in the lower part. The potential for frost action is high in both soils.

In most areas these soils are cultivated. They are moderately suited to cultivated crops, hay, pasture, and woodland. They are poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further erosion is a hazard. Contour farming, terraces, and a conservation tillage system that leaves crop residue on the surface after planting help to control erosion and maintain productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake. The high content of exchangeable sodium in the subsoil of the Darmstadt soil reduces the availability and uptake of some plant nutrients and causes plant stress in most years. Soybean and wheat yields are less affected by the high content of sodium than are corn yields.

In areas used for hay and pasture, erosion is a hazard. A nurse crop of rye helps to control erosion during periods when the pasture is becoming established. A no-till seeding system helps to control erosion during pasture renovation. Timely harvesting and grazing and applications of fertilizer help to keep the pasture or hayland in good condition and help to control erosion.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soils.

In areas used as sites for septic tank absorption fields, the seasonal high water table and the very slow and slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIe.

916—Oconee-Darmstadt silt loams. These nearly level, somewhat poorly drained soils are on broad ridges in the uplands. Individual areas are irregular in shape and range from 5 to 150 acres in size. They are about 50 to 75 percent Oconee soil and 25 to 50 percent Darmstadt soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Oconee soil is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown and light brownish gray, mottled, friable silt loam about 7 inches thick. The subsoil is about 37 inches thick. The upper part is dark grayish brown, mottled, firm silty clay loam. The next part is brown and grayish brown, mottled, firm silty clay and silty clay loam. The lower part is grayish brown, mottled, friable silt loam. The substratum to a depth of 60 inches or more is light brownish gray and grayish brown, mottled, friable silt loam. In places the surface layer is lighter in color.

Typically, the surface layer of the Darmstadt soil is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown and light brownish gray, friable silt loam about 10 inches thick. The subsoil extends below a depth of 60 inches. The upper part is pale brown, mottled, firm silty clay loam. The next part is light brownish gray, mottled, firm silty clay loam. The lower part is light brownish gray, mottled, friable silt loam. In some areas the surface layer is darker.

Included with these soils in mapping are small areas of the moderately well drained Tamalco soils on the slightly higher ridges and knolls and the poorly drained Cisne and Huey soils in the slightly lower positions on the landscape. Included soils make up 5 to 10 percent of the unit.

Air and water move through the Oconee soil at a slow rate and through the Darmstadt soil at a very slow rate. Surface runoff is slow in cultivated areas of both soils. The seasonal high water table is at a depth of 1 to 3 feet from February through June in most years. Available water capacity is high in the Oconee soil and moderate in the Darmstadt soil. Organic matter content is moderate in both soils. The subsoil of the Oconee soil is slightly acid to very strongly acid. The subsoil of the Darmstadt soil is very strongly acid to strongly alkaline. The strong alkalinity results from a high content of exchangeable sodium. The shrink-swell potential is high in the upper part of the subsoil in the Oconee soil and

moderate in the lower part. It is moderate in the upper part of the subsoil in the Darmstadt soil and low in the lower part. The potential for frost action is high in both soils.

In most areas these soils are cultivated. They are moderately suited to cultivated crops, hay, pasture, and woodland. They are poorly suited to dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting or harvesting in some years. Shallow surface ditches help to remove excess surface water. The high content of exchangeable sodium in the subsoil of the Darmstadt soil reduces the availability and uptake of some plant nutrients and causes plant stress in most years. Soybean and wheat yields are less affected by the high content of sodium than are corn yields. A conservation tillage system and crop residue management improve soil tilth and minimize crusting.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Diverting surface water away from the dwellings and installing subsurface drains at the base of foundations help to overcome the wetness. The foundations should be designed so that they can withstand the shrink-swell movement of the soils.

In areas used for septic tank absorption fields, the seasonal high water table and the slow or very slow permeability are limitations. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome these limitations. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength, the high potential for frost action, and the shrink-swell potential are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is IIIw.

929D3—Hickory-Ava silty clay loams, 10 to 18 percent slopes, severely eroded. These strongly sloping, moderately well drained soils are on the side slopes along drainageways in the uplands. The Hickory soil is on the upper part of the slopes, and the Ava soil is on the lower part. In most areas, nearly all of the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas are elongated and range from 3 to 75 acres in size. They are about 55 to 75 percent Hickory soil and 25 to 45 percent Ava soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Hickory soil is brown and dark brown, firm silty clay loam about 8 inches thick. The subsoil to a depth of more than 60 inches is mottled, firm clay loam. The upper part is strong brown and pale brown, the next part is yellowish brown and strong brown, and the lower part is yellowish brown.

Typically, the surface layer of the Ava soil is dark yellowish brown, friable silty clay loam about 6 inches thick. The subsoil extends below a depth of 60 inches. The upper part is yellowish brown, mottled, friable silty clay loam; the next part is yellowish brown, mottled, firm, slightly brittle silt loam and silty clay loam; and the lower part is yellowish brown and grayish brown, firm clay loam. In some areas the lower part of the subsoil has less sand.

Included with these soils in mapping are areas of the somewhat poorly drained Atlas, Blair, and Bluford and moderately well drained Wellston soils. Atlas, Blair, and Bluford soils are on side slopes at the head of drainageways. Also, Atlas and Blair soils are on side slopes between the Ava and Hickory soils. Wellston soils have soft shale and sandstone bedrock within a depth of 60 inches. They are lower on the landscape than the Hickory soil. Included soils make up about 5 to 10 percent of the unit.

Air and water move through the Hickory soil at a moderate rate. They move through the upper part of the Ava soil at a moderate rate and through the lower part at a very slow rate. Surface runoff is rapid on both soils. Available water capacity is high. The seasonal high water table is 2 to 4 feet below the surface of the Ava soil from March through June in most years. The subsoil of both soils is very strongly acid to medium acid, and the surface layer is very strongly acid to neutral. The shrink-swell potential is moderate. The potential for frost action is moderate in the Hickory soil and high in the Ava soil.

Most areas are cultivated. Some are used as unimproved pasture. These soils generally are unsuited to cultivated crops because of the erosion hazard. They are moderately suited to hay, pasture, and woodland. They are poorly suited to dwellings and septic tank absorption fields.

In the areas used as pasture, further erosion is a severe hazard, especially during periods when the pasture is becoming established. Seeding on the contour, applying a no-till seeding system, and adding lime and fertilizer help to establish the pasture and control erosion. The pasture should be allowed sufficient time to become established before it is grazed. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

In areas used as woodland, plant competition is a management concern. It affects the seedlings of desirable species. It can be controlled by chemical or

mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In the areas used as sites for dwellings, the seasonal high water table in the Ava soil and the shrink-swell potential and slope of both soils are limitations. Installing a drainage system helps to lower the water table. Foundations should be designed so that they can withstand the shrink-swell movement of the soils. Cutting and filling help to overcome the slope.

In areas used as sites for septic tank absorption fields, the seasonal high water table in the Ava soil and the restricted permeability and slope of both soils are limitations. Underground drains help to lower the water table. Land leveling is needed. A specially designed septic system that includes a sealed sand filter and a disinfection tank helps to overcome the restricted permeability. An aerobic waste disposal system is an alternative.

In areas used as sites for local roads and streets, low strength and the potential for frost action are limitations. Replacing the base material with suitable fill material helps to overcome these limitations.

The land capability classification is VIe.

991—Cisne-Huey silt loams. These nearly level, poorly drained soils are on broad flats in the uplands. The Huey soil is frequently ponded in the spring. Individual areas are irregular in shape and range from 5 to 150 acres in size. They are about 50 to 75 percent Cisne soil and 25 to 50 percent Huey soil. The two soils occur as areas so intricately mixed that separating them in mapping is not practical.

Typically, the surface layer of the Cisne soil is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is grayish brown and light brownish gray, friable silt loam about 8 inches thick. The subsoil extends below a depth of 60 inches. The upper part is dark gray, mottled, firm silty clay. The next part is light brownish gray, mottled, firm silty clay loam. The lower part is light brownish gray, mottled, friable silt loam. In places the surface layer is not so dark.

Typically, the surface layer of the Huey soil is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown and grayish brown, friable silt loam about 3 inches thick. The subsoil extends below a depth of 60 inches. The upper part is grayish brown, mottled, friable silt loam. The next part is dark grayish brown and grayish brown, mottled, firm silty clay loam. The lower part is gray, mottled, friable, calcareous silty clay loam.

Included with these soils in mapping are small areas of the somewhat poorly drained Darmstadt and Hoyleton and moderately well drained Tamalco soils. Darmstadt and Hoyleton soils are on low ridges on the slightly higher parts of the landscape. Tamalco soils are on prominent ridges and knolls on the higher parts of the landscape. Included soils make up 5 to 10 percent of the unit.

Air and water move through the Cisne and Huey soils at a very slow rate. Surface runoff is slow to ponded in cultivated areas. The Cisne soil has a seasonal high water table within a depth of 2 feet from February through June in most years. The Huey soil has one 0.5 foot above the surface to 2.0 feet below from March through June in most years. Available water capacity is high in the Cisne soil and moderate in the Huey soil. Organic matter content is moderate in both soils. The subsoil in the Cisne soil is very strongly acid to slightly acid. The subsoil in the Huey soil is medium acid to strongly alkaline. The strong alkalinity results from a high content of exchangeable sodium. The shrink-swell potential is high in the Cisne soil and moderate in the Huey soil. The potential for frost action is high in both soils.

In most areas these soils are cultivated. They are moderately suited to cultivated crops, hay, and pasture. They are poorly suited to woodland. They generally are unsuited to dwellings and septic tank absorption fields because of the seasonal high water table, the shrink-swell potential, and the restricted permeability.

In the areas used for corn, soybeans, or small grain, the seasonal high water table delays planting or harvesting in most years. Shallow surface ditches help to remove excess surface water. The high content of exchangeable sodium in the subsoil of the Huey soil reduces the availability and uptake of some plant nutrients and causes plant stress in most years. Soybean and wheat yields are less affected by the high content of sodium than are corn yields. A conservation tillage system and crop residue management improve tilth and minimize crusting.

In areas used for hay and pasture, the seasonal high water table is a limitation. Surface drains help to remove excess surface water. Deferred grazing during wet periods helps to prevent surface compaction and deterioration of tilth. Harvesting hay during dry periods helps to prevent compaction and crop damage.

In areas used as sites for local roads and streets, low strength, the seasonal high water table, and the high potential for frost action are limitations. Replacing the base material with suitable fill material and installing a drainage system help to overcome these limitations.

The land capability classification is IVw.

1108—Bonnie silt loam, wet. This nearly level, poorly drained soil is in depressions, old stream channels and sloughs, and other low areas on flood plains. It is frequently flooded and ponded for long periods from January through June in most years. Individual areas are elongated or irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The substratum extends below a depth of 60 inches. It is mottled and friable. The upper part is grayish brown silt loam, and the lower part is light brownish gray silty clay loam.

Included with this soil in mapping are small areas of soils that are on the slightly higher parts of the flood plains and are not subject to ponding. Also included are small areas of the poorly drained, clayey Karnak soils in landscape positions similar to those of the Bonnie soil. Included soils make up about 5 percent of the unit.

Air and water move through the Bonnie soil at a moderately slow rate. Surface runoff is slow to ponded. The seasonal high water table is 0.5 foot above the surface to 1 foot below from February through June in most years. Available water capacity is high. Organic matter content is moderately low. The substratum generally is very strongly acid. The shrink-swell potential is low. The potential for frost action is high.

In most areas this soil is wooded. It is moderately suited to woodland and well suited to habitat for wetland wildlife. It is generally unsuited to cultivated crops, pasture, hay, dwellings, and septic tank absorption fields because of the flooding and ponding.

In the areas used as woodland, the equipment limitation, seedling mortality, and windthrow are management concerns because of the wetness. Plant competition also is a concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. The use of equipment should be limited to periods when the soil is firm and dry. Selecting planting stock that is larger than is typical and planting on ridges reduce the seedling mortality rate. Applying harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to prevent windthrow. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

This soil provides good habitat for wetland wildlife. It is along the major streams, which provide habitat for game fish. Also, shallow water areas are available, and others could be easily established. Grain and seed crops, wild herbaceous plants, wetland plants, and other important habitat elements generally are available.

The land capability classification is Vw.

5002—Cisne silt loam, mine sinks. This nearly level, poorly drained soil is on broad flats in areas that include abandoned underground coal mines. Because of subsidence, circular mine sinks that are about 2 to 8 feet deep have formed. They are ponded for long periods. Sediment accumulates at the bottom of the sinks. Individual areas are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown, light brownish gray, and dark grayish brown, friable silt loam about 12 inches thick. The subsoil extends below a depth of 60 inches. It is grayish brown and light brownish gray and is mottled. The upper part is firm silty clay, the next part is firm silty clay loam, and the lower part is friable silt loam. In places the surface layer is lighter in color.

Included with this soil in mapping are small areas of the somewhat poorly drained Darmstadt and Hoyleton and poorly drained Huey soils. Darmstadt and Huey soils have a high content of sodium in the subsoil. They are slightly higher on the landscape than the Cisne soil or are in similar landscape positions. Hoyleton soils are in the slightly higher areas. Also included are soils in areas that have not subsided and that are not ponded. Included soils make up 15 to 25 percent of the unit.

Air and water move through the Cisne soil at a very slow rate. Surface runoff is slow to ponded. The seasonal high water table is 6 feet above the surface to 2 feet below from February through June in most years. Available water capacity is high. Organic matter content is moderate. The subsoil is very strongly acid to slightly acid. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is wooded. It is poorly suited to woodland and moderately suited to habitat for woodland wildlife. It generally is unsuited to cultivated crops, hay, pasture, dwellings, and septic tank absorption fields because of the ponding and the potential for further subsidence.

In the areas used as woodland, the equipment limitation, seedling mortality, and windthrow are management concerns because of the wetness. Plant competition also is a concern. It affects the seedlings of desirable species. It can be controlled by chemical and mechanical means. The use of equipment should be limited to periods when the soil is firm and dry. Selecting planting stock that is larger than is typical and planting on ridges reduce the seedling mortality rate. Applying harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to prevent windthrow. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as habitat for woodland wildlife, adequate stands of herbaceous cover can be maintained. The ponding and low fertility, however, limit the extent of grain and seed crops.

The land capability classification is Vw.

5912—Hoyleton-Darmstadt silt loams, mine sinks. These nearly level, somewhat poorly drained soils are in

areas that include abandoned underground coal mines. Because of subsidence, mine sinks that generally are circular and that are 2 to 8 feet deep have formed. They are ponded for long periods. Sediment accumulates at the bottom of the sinks. Individual areas are irregular in shape and range from 10 to 80 acres in size. They are about 40 to 65 percent Hoyleton soil and 30 to 50 percent Darmstadt soil. The soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the surface layer of the Hoyleton soil is dark brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 35 inches thick. The upper part is red, strong brown, and brown, mottled, firm silty clay. The next part is light brownish gray and pale brown, mottled, firm silty clay loam. The lower part is brown, mottled, friable silt loam. The substratum to a depth of 60 inches or more also is brown, mottled, friable silt loam. In some areas the surface layer is not so dark.

Typically, the surface layer of the Darmstadt soil is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown and light brownish gray, friable silt loam about 10 inches thick. The subsoil extends below a depth of 60 inches. The upper part is pale brown, mottled, firm silty clay loam. The next part is light brownish gray, mottled, firm silty clay loam. The lower part is light brownish gray, mottled, friable silt loam. In some areas the surface layer is darker.

Included with these soils in mapping are small areas of the moderately well drained Tamalco and poorly drained Cisne and Huey soils. Tamalco soils are on the slightly higher ridges and knolls. Cisne and Huey soils are in the slightly lower positions on the landscape. Also included are soils in areas that have not subsided and that are not ponded. Included soils make up 15 to 25 percent of the unit.

Air and water move through the Hoyleton soil at a slow rate and through the Darmstadt soil at a very slow rate. Surface runoff is slow to ponded on both soils. The seasonal high water table is as much as 6 feet above the surface from February through July in most years. In areas where subsidence has not yet occurred, the seasonal high water table is at a depth of 1 to 3 feet during this period. Available water capacity is high in the Hoyleton soil and moderate in the Darmstadt soil. Organic matter content is moderate in both soils. The subsoil in the Hoyleton soil is very strongly acid to slightly acid. The subsoil in the Darmstadt soil is very strongly acid to strongly alkaline. The strong alkalinity results from a high content of exchangeable sodium. The shrink-swell potential is high in the upper part of the subsoil in the Hoyleton soil and moderate in the lower part. It is moderate in the upper part of the subsoil in the Darmstadt soil and low in the lower part. The potential for frost action is high in both soils.

In most areas these soils are wooded. They are moderately suited to woodland and to habitat for woodland wildlife. They generally are unsuited to cultivated crops, hay, pasture, dwellings, and septic tank absorption fields because of the ponding and the potential for further subsidence.

In the areas used as woodland, the equipment limitation, seedling mortality, and windthrow are management concerns because of wetness. Plant competition also is a concern. It affects the seedlings of desirable species. It can be controlled by chemical or mechanical means. The use of equipment should be restricted to periods when the soil is firm and dry. Selecting planting stock that is larger than is typical and planting on ridges reduce the seedling mortality rate. Applying harvest methods that do not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland help to prevent windthrow. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Fire prevention is needed.

In areas used as habitat for woodland wildlife, adequate stands of herbaceous cover can be maintained. The ponding and low fertility, however, limit the extent of grain and seed crops.

The land capability classification is Vw.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has

Figure 9.—A soybean field in an area of Cisne and Hoyleton soils. These soils are the most extensive areas of prime farmland in the county.

few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 152,475 acres in Perry County, or nearly 54 percent of the total acreage, meets the soil requirements for prime farmland. Associations 1, 3, 4, 5, and 6, which are described under the heading "General Soil Map Units," have the highest percentage of this land (fig. 9). Approximately 90 percent of the prime farmland is used for crops, mainly soybeans, corn, and wheat.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate, and usually less productive.

The map units in Perry County that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potential of natural resources and the environment. Also, it can help to avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 116,000 acres in Perry County was used for corn, soybeans, and small grain in 1979, and about 37,640 acres was used for hay and pasture. The soils in the county have fair or good potential for increased crop production. This soil survey can be used as a valuable guide to the latest management techniques that increase food and fiber production.

The chief management needs in the county are measures that control erosion, drain the wetter soils, reduce the droughtiness of some soils, and maintain fertility and tilth.

Water erosion is a major problem on about 28 percent of the cropland and pasture in the county. It is a hazard if the slope is more than 2 percent. It is a severe hazard if the slope is more than 5 percent.

Sheet erosion, or loss of the surface layer, is damaging for three reasons. First, the productivity of most soils is reduced if the surface layer is eroded away and the subsoil is incorporated into the plow layer. Second, severe erosion on sloping soils impairs the tilth of the surface soil and reduces the rate of water intake. It is especially damaging on clayey soils, which tend to be cloddy if worked when wet and to crust after a hard rain. As a result of the cloddiness, preparing a good seedbed is difficult and the runoff rate is increased. Third, uncontrolled erosion allows sediment to enter drainage ditches, streams, lakes, rivers, and road ditches. Removing this sediment is expensive. Management that controls erosion also helps to prevent pollution by sediment and improves water quality for municipal and recreational uses and for fish and wildlife.

Terraces, contour farming, and conservation tillage systems help to control erosion. They also increase the rate of water intake and reduce the runoff rate. Terraces are most effective in areas where slopes are smooth and uniform. A system of conservation tillage that leaves crop residue on the surface throughout the year, such as no-till and chisel planting, can significantly reduce the extent of erosion on many soils in the county. No-till is most effective on moderately well drained and well drained soils.

Further information about measures that control erosion is provided in the Technical Guide, available in local offices of the Soil Conservation Service.

Many of the soils are naturally so wet that the production of the crops commonly grown in the county is not feasible unless a drainage system is installed. These are the poorly drained Cisne, Huey, Weir, and Wynoose soils on uplands, the poorly drained Okaw and Wagner soils on stream terraces, and the poorly drained Bonnie and Karnak soils on bottom land. Unless drained, somewhat poorly drained soils are wet enough in some years for crop growth and productivity to be reduced. Examples are Belknap, Bluford, Hoyleton, Oconee, and Stoy soils.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface drains and tile drainage is needed in most areas of poorly drained soils used for intensive row cropping.

Tile drains do not function well in many of the soils in the county unless the spacing between drainage lines is closer than is typical. Subsurface drains are effective in moderately slowly permeable soils, such as Belknap and Bonnie soils, if suitable outlets are available. Tile drainage is not effective, however, in slowly permeable and very slowly permeable soils, such as Cisne, Karnak, Okaw, Wagner, Weir, and Wynoose soils.

Surface drainage measures, such as deep and shallow ditches and land leveling, are commonly used in most of the wet soils in the county. The ditches should be protected from the silt deposition and ditchbank erosion caused by runoff.

Soil droughtiness limits yields on some of the soils used for crops and pasture in the county. Morristown soils, for example, are so stony that they are unable to store the water necessary to maintain plant growth. Other soils, such as Ava, Banlic, Darmstadt, Hosmer, Huey, and Tamalco soils, have layers or zones that restrict root penetration or that inhibit the uptake of water and plant nutrients. Plant stress is soon evident during hot, windy days. Many of the wet, clayey soils have similar limitations. Karnak, Okaw, and Wynoose soils hold large amounts of water, but little water is readily available to plant roots. Most of the water is tightly held in a film surrounding clay particles.

The effects of droughtiness can be minimized by increasing the rate of water intake, by reducing the runoff rate, or by planting drought-tolerant crops or crop varieties. Such crops as soybeans and grain sorghum are more drought tolerant than corn. Winter wheat can be grown on droughty soils because it matures in the spring, before the water stored in the soil is depleted. Some of the more commonly used methods of increasing the rate of water intake and reducing the runoff rate are applying a reduced tillage or zero tillage system, returning crop residue to the soil, and planting cover crops.

Soil fertility is naturally low in most of the soils on uplands in the county. Except for Darmstadt, Huey, and Tamalco soils, which have a high content of sodium in the subsoil and are mildly alkaline or moderately alkaline, and soils in surface-mined areas, which generally are mildly alkaline or moderately alkaline, most of the soils in the uplands are naturally acid. Soils on terraces, such as Colp, Hurst, and Okaw, and soils on bottom land, such as Belknap, Bonnie, and Karnak, also are acid. On most acid soils, applying limestone helps to raise the pH to the level that is needed for optimum plant growth.

Most of the soils in the county are naturally low to moderate in organic matter content. Many crops, particularly corn and wheat, respond well to applications of nitrogen fertilizer. Planting legumes, which take nitrogen from the air and fix it in the soil, and adding livestock waste help to replenish the nitrogen supply in the soil. Additions of lime, nitrogen, phosphorus, potassium, or any other elements should be based on the results of soil tests. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is an important factor affecting the germination of seeds, the amount of runoff, and the rate of water intake. Soils with good tilth are granular and porous.

Most of the soils used for cultivated crops in the county have a silt loam surface layer that is light in color and that has a low to moderate content of organic matter. Generally, the structure of the surface layer in these soils is weak or moderate. During periods of heavy rainfall, a crust forms on the surface. When dry, this crust is hard and thus greatly restricts the infiltration of water into the soil. Reducing the amount of water that enters the soil increases the amount of runoff. Growing grasses and regularly adding crop residue, manure, and other organic material improve tilth and minimize crusting.

Fall plowing is not a suitable method of improving the tilth of most soils in the county. The beating action of winter and spring rains results in a surface layer that is nearly as compact and hard at planting time as it was before the soils were plowed. Also, many soils are on sloping topography and are subject to erosion if they are plowed in the fall.

Tilth is a problem in the clayey Karnak soils, which often stay wet until late in spring. If these soils are plowed when wet, they tend to be cloddy. Because of the cloddiness, preparing a good seedbed is difficult. Plowing or tilling these soils in the fall generally results in better tilth in the spring.

Field crops suited to the soils and climate in the county include many that are not commonly grown. Soybeans and corn are the major row crops. Grain sorghum is grown in some areas. Wheat is the main close-growing crop. Oats, rye, and barley are occasionally grown.

Suitable pasture and hay plants include several legumes, cool-season grasses, and warm-season grasses. Alfalfa and red clover are the most common legumes grown for hay. They also are included in mixtures with bromegrass, orchardgrass, and fescue grown for hay and pasture.

The most commonly grown warm-season, native grasses are little bluestem, indiangrass, and switchgrass. These grasses grow well during the summer. They have different management requirements than cool-season grasses.

Alfalfa is best suited to deep, moderately well drained and well drained soils, such as Ava, Hickory, Hosmer, Richview, Schuline, and Swanwick soils. Other legumes and grasses grow well on these soils and on other upland soils that are somewhat poorly drained. Bluford, Hoyleton, Oconee, and Stoy soils are examples of soils suited to most pasture and hay plants. In areas of poorly drained soils, such as Bonnie, Cisne, Weir, and Wynoose soils, water-tolerant species should be selected for planting.

Well managed stands of forage species are effective in controlling erosion. The need for lime and fertilizer and overgrazing are common management concerns. The amount of lime and fertilizer to be added should be based on the results of soil tests, the needs of the plants, and the expected level of production.

Overgrazing reduces the vigor of the pasture plants and forage production. It also allows the extent of weeds and brush to increase. It can be prevented by measures that maintain fertility, timely deferment of grazing, rotation grazing, and proper stocking rates. Deferring grazing gives the pasture a rest period during which the forage species can build up carbohydrate reserves. Rotation grazing among several areas of pasture gives each area a rest period.

The information in table 6 can be helpful in estimating the number of animals that can be carried in a pasture. Many soils in the county have a high water table in the spring. Deferring grazing when the surface layer of these soils is wet minimizes surface compaction. Pasture renovation is needed in areas where compaction has occurred. Frost heaving of alfalfa and red clover is a more severe hazard on the soils that have a high water table than on other soils. Leaving stubble on the surface during winter and growing grass-legume mixtures reduce this hazard. The stubble should be 4 to 6 inches high.

Apples, peaches, and grapes are grown mainly in the areas that formerly were surface mined and to a limited extent on other soils in the county. Some strawberries also are grown commercially.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents (*8*). Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*18*). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

When settlers moved to Perry County, hardwood forests covered most areas, except for a few areas of prairie. According to one study, about 61,000 acres in the county was used as woodland in 1965 (*6*). According to a more recent study, the wooded acreage has decreased to 42,803 acres (*5*).

Much of the remaining woodland is in areas of soils that are unsuitable for cultivation because they are too steep, too wet, too stony, or inaccessible. The soils in the wooded areas have fair or good potential for trees of high quality if the best suited species are selected for planting and the woodland is properly managed.

The largest areas of woodland are in soil associations 1, 2, 7, 8, and 9, which are described under the heading "General Soil Map Units." The most common desirable trees on uplands are white oak, red oak, black oak, hickory, black walnut, and yellow-poplar. The main species on bottom land are pin oak, yellow-poplar, sweetgum, sycamore, and cottonwood.

Selective cutting as the trees mature and removal of undesirable species improve the stands. Competing vegetation should be removed when seedlings are planted. Protection from grazing and fire and control of disease and insects are needed.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excessive water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, high content of rock fragments in the soil; and *L*, low strength. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and L.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of

use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough to give adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Pyramid State Park, which is in an area of reclaimed surface mine spoil, provides a variety of recreational opportunities. Several private recreational areas are throughout the county. These include ponds, small lakes, hunting areas, campgrounds, and a golf course.

The potential for additional recreational development of the county is fair. The areas having the best potential are in soil associations 7, 8, and 9, which are described in the section "General Soil Map Units." The hilly terrain, wooded side slopes, and bodies of water in areas of these associations can provide opportunities for a variety of recreational uses.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the

size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Perry County has a large and varied population of fish and wildlife. The types of habitat also vary considerably. They include hilly woodlands, rolling pastures, nearly level cropland, swampy areas, and spoil banks in surface-mined areas (fig. 10). Deer, squirrels, rabbits, quail, songbirds, ducks, and geese are common in these areas. Fox, raccoons, groundhogs, skunks, hawks, and snakes also thrive in these areas.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and

Figure 10.—An area of Lenzberg soils, which provides good habitat for openland wildlife.

features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also

considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are lambsquarters, goldenrod, beggarweed, wheatgrass, and foxtail.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5)

plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil

through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, and flooding affect absorption of the effluent. Large stones interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during the wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil

after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5

feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Illinois Department of Transportation.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*19*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, acid, mesic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*17*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*19*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Atlas Series

The Atlas series consists of somewhat poorly drained, very slowly permeable soils on side slopes near the upper end of drainageways. These soils formed in a thin mantle of loess or silty sediments and in a paleosol that formed in glacial till. Slopes range from 10 to 18 percent.

Atlas soils are commonly adjacent to Belknap, Blair, and Hickory soils. Belknap soils are subject to flooding and are on bottom land along small streams that dissect the till plains. Blair soils are on side slopes near the upper end of drainageways. They have less sand and clay in the subsoil than the Atlas soils. Hickory soils are

moderately well drained and well drained and are on the steeper side slopes below the Atlas soils.

Typical pedon of Atlas silty clay loam, 10 to 18 percent slopes, severely eroded, 1,600 feet west and 514 feet south of the northeast corner of sec. 3, T. 4 S., R. 3 W.

Ap—0 to 5 inches; brown (10YR 4/3) silty clay loam, yellowish brown (10YR 5/4) dry; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure parting to weak medium granular; friable; common very fine and fine roots; few fine pebbles; neutral; abrupt smooth boundary.

Bt—5 to 8 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and common fine faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; common very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); dark brown (10YR 3/3) silty clay loam krotovina 2 centimeters thick; few fine, medium, and coarse pebbles; very strongly acid; clear smooth boundary.

Btg1—8 to 13 inches; grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) silty clay; common medium distinct yellowish brown (10YR 5/8) and few fine faint light brownish gray (10YR 6/2) mottles; weak medium platy structure parting to weak medium subangular blocky; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine and medium dark concretions (iron and manganese oxides); common fine and few medium pebbles; very strongly acid; clear smooth boundary.

Btg2—13 to 23 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium and coarse prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium and coarse subangular blocky; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common fine and medium and few coarse concretions (iron and manganese oxides); common fine and few medium pebbles; very strongly acid; gradual smooth boundary.

Btg3—23 to 30 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium and coarse strong brown (7.5YR 5/8) mottles; weak medium and coarse prismatic structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine stains (iron and manganese oxides); common fine and few medium pebbles; medium acid; clear smooth boundary.

Btg4—30 to 43 inches; gray (5Y 6/1) clay loam; few medium prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; firm; common distinct dark gray (5Y 4/1) clay films on faces of peds; many fine black (10YR 2/1) stains (iron and manganese oxides); common fine and few medium pebbles; neutral; clear smooth boundary.

Btg5—43 to 60 inches; gray (5Y 6/1) clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak medium and coarse prismatic structure; firm; few distinct gray (5Y 5/1) clay films on faces of peds; common fine and medium and few coarse pebbles; mildly alkaline.

The solum ranges from 50 to more than 60 inches in thickness. The Ap or A horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 to 6. It is very strongly acid in the upper part and ranges to mildly alkaline in the lower part.

Ava Series

The Ava series consists of moderately well drained soils on ridges and convex side slopes along upland drainageways. These soils formed in about 3 feet of loess and in the underlying silty sediments. Permeability is moderate and moderately slow in the upper part of the profile and very slow in the lower part. Slopes range from 2 to 18 percent.

The Ava soils in this survey area are taxadjuncts to the series because the Bx horizon, which has moderate medium subangular blocky structure, does not qualify as a fragipan and because the content of sand in the lower part of the solum is less than 10 percent. These differences, however, do not significantly affect the usefulness or behavior of the soils.

Ava soils are similar to Hosmer soils and are commonly adjacent to Blair, Bluford, Hickory, and Wynoose soils. Hosmer soils formed entirely in loess. The somewhat poorly drained Blair soils formed mainly in silty sediments over a paleosol that formed in glacial till. They are on side slopes below the Ava soils. The somewhat poorly drained Bluford soils are generally on the less sloping ridges and convex side slopes along drainageways. Hickory soils formed primarily in glacial till. They are in the more sloping areas below the Ava soils. The poorly drained Wynoose soils are on broad upland flats.

Typical pedon of Ava silt loam, 2 to 5 percent slopes, 2,310 feet south and 350 feet east of the center of sec. 36, T. 4 S., R. 1 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; weak fine and medium granular structure; friable; common very fine and fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds in the upper

part; few fine dark concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

E—6 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine and medium subangular blocky structure; friable; few very fine and fine roots; few distinct dark brown (10YR 3/3) organic coatings on faces of peds in the upper part; few fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

BE—14 to 23 inches; yellowish brown (10YR 5/6) silt loam; common fine faint yellowish brown (10YR 5/4) mottles; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few fine and medium roots; few distinct white (10YR 8/1 dry) silt coatings on faces of peds in the lower part; few fine dark concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

B/E—23 to 28 inches; brown (10YR 5/3) silty clay loam (B); common medium distinct yellowish brown (10YR 5/6) and few fine distinct dark yellowish brown (10YR 4/6) mottles; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; many prominent white (10YR 8/1 dry) silt (E) coatings on more than 50 percent of the faces of peds; firm in the B part, friable in the E part; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds in the B part; few fine dark concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Bt—28 to 41 inches; pale brown (10YR 6/3) silty clay loam; common fine distinct grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine and fine roots; many distinct brown (10YR 4/3) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Btx—41 to 60 inches; grayish brown (10YR 5/2) silt loam; common medium and coarse distinct dark yellowish brown (10YR 4/4) and common fine and medium prominent pinkish gray (7.5YR 6/2) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; slightly brittle; few very fine and fine roots; common distinct brown (10YR 4/3) clay films and common distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid.

The solum ranges from 40 to more than 60 inches in thickness. The depth to the underlying silty sediments ranges from about 30 to more than 60 inches. The depth to the Bx horizon ranges from 28 to about 45 inches.

The A or Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is silt loam or silty clay loam. The E horizon has value of 4 or 5 and chroma 4 to 6. The Bt horizon has value of 5 or 6 and chroma of 3 to 6. It is silt loam or silty clay loam. It is strongly acid or very strongly acid.

Banlic Series

The Banlic series consists of somewhat poorly drained, slowly permeable soils on low terraces. These soils formed in acid, silty material of mixed origin. Slopes range from 0 to 2 percent.

Banlic soils are similar to Belknap soils and are commonly adjacent to Belknap and Bonnie soils. The adjacent soils are generally on the lower parts of flood plains. They formed in silty recent alluvium. They do not have a brittle layer.

Typical pedon of Banlic silt loam, 226 feet north and 484 feet west of the center of sec. 31, T. 5 S., R. 2 W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; few very fine and fine roots; few fine concretions (iron and manganese oxides); mildly alkaline; abrupt smooth boundary.

A—5 to 8 inches; brown (10YR 4/3) silt loam; many fine faint dark yellowish brown (10YR 4/4) mottles; weak fine and medium subangular blocky structure; friable; few very fine and fine roots; few fine and medium concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

E—8 to 13 inches; brown (10YR 5/3) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; few very fine roots; few fine concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bw—13 to 21 inches; pale brown (10YR 6/3) silt loam; common fine distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bx1—21 to 27 inches; brown (10YR 5/3) silt loam; common fine faint light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; brittle; few very fine roots; common prominent white (10YR 8/1 dry) silt coatings on faces of peds; common fine concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bx2—27 to 38 inches; brown (10YR 5/3) silt loam; common medium distinct light brownish gray (10YR 6/2) and common medium distinct yellowish brown

(10YR 5/6) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; firm; brittle; few very fine roots; common prominent white (10YR 8/1 dry) silt coatings on vertical faces of peds; common fine concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

BCg—38 to 55 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; few very fine roots; few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common medium concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Cg—55 to 60 inches; mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) silt loam; massive; friable; many fine concretions (iron and manganese oxides); slightly acid.

The Ap horizon has value of 4 or 5. The Bw horizon has value of 5 or 6 and chroma of 2 or 3. The depth to the Bx horizon is commonly about 20 to 24 inches. This horizon ranges from about 17 to 40 inches in thickness. It is very strongly acid or strongly acid. The Cg horizon has value of 5 or 6 and chroma of 2 to 4.

Belknap Series

The Belknap series consists of somewhat poorly drained, moderately slowly permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Belknap soils are similar to Banlic and Bonnie soils and are commonly adjacent to Banlic, Bonnie, and Hickory soils. Banlic soils have a fragipan. They are on terraces above the Belknap soils. The poorly drained Bonnie soils are in the lower areas on the flood plains. Hickory soils are on side slopes in the uplands.

Typical pedon of Belknap silt loam, 90 feet north and 125 feet west of the center of sec. 32, T. 6 S., R. 3 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; few fine faint grayish brown (10YR 5/2) mottles; weak fine granular structure; friable; few very fine roots; neutral; abrupt smooth boundary.

C1—9 to 15 inches; stratified grayish brown (10YR 5/2) and brown (10YR 4/3) silt loam; common fine and medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few very fine roots; few fine dark concretions (iron and manganese oxides); strongly acid; gradual smooth boundary.

C2—15 to 22 inches; stratified brown (10YR 5/3) and grayish brown (10YR 5/2) silt loam; common fine and medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few very fine roots; common fine and medium concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

C3—22 to 34 inches; stratified brown (10YR 5/3) and light brownish gray (10YR 6/2) silt loam; common fine and medium faint brown (10YR 4/3) mottles; massive; friable; very strongly acid; gradual smooth boundary.

C4—34 to 60 inches; brown (10YR 5/3) silt loam; common fine faint brown (10YR 4/3) and common medium distinct dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2) mottles; massive; friable; very strongly acid.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The control section is medium acid to very strongly acid. The C horizon has chroma of 1 to 3 and has mottles with chroma of 2 or more.

Blair Series

The Blair series consists of somewhat poorly drained, moderately slowly permeable soils on side slopes near the upper end of upland drainageways. These soils formed in a thin mantle of loess and in silty sediments over a paleosol that formed in glacial till. Slopes range from 5 to 18 percent.

Blair soils are commonly adjacent to Darmstadt, Hickory, and Hoyleton soils. Darmstadt soils have a natric horizon. They are in the less sloping areas near the head of drainageways. The well drained Hickory soils are on the steeper, lower, side slopes along drainageways. Hoyleton soils are on the less sloping ridges or are nearer the head of drainageways than the Blair soils.

Typical pedon of Blair silty clay loam, 10 to 18 percent slopes, severely eroded, 1,280 feet north and 700 feet west of the center of sec. 15, T. 4 S., R. 2 W.

Ap—0 to 5 inches; yellowish brown (10YR 5/4) silty clay loam, light yellowish brown (10YR 6/4) dry; common fine faint yellowish brown (10YR 5/6) mottles; moderate coarse angular blocky structure parting to weak fine subangular blocky; firm; few distinct dark brown (10YR 4/3) coatings on faces of peds; about 3 percent total sand; slightly acid; abrupt smooth boundary.

Bt1—5 to 12 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; common distinct dark brown (10YR 4/3) clay films and few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 1 percent fine pebbles; about 14 percent total sand; very strongly acid; clear smooth boundary.

Bt2—12 to 20 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown (10YR

5/6) and pale brown (10YR 6/3) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 1 percent fine and medium pebbles; about 15 percent total sand; very strongly acid; gradual smooth boundary.

Bt3—20 to 30 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few distinct dark gray (10YR 4/1) clay films on faces of peds; about 2 percent fine and medium pebbles; about 18 percent total sand; strongly acid; clear smooth boundary.

Bt4—30 to 36 inches; light brownish gray (10YR 6/2) silt loam; common medium faint grayish brown (10YR 5/2) and many medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine black (10YR 2/1) concretions (iron and manganese oxides); about 2 percent fine and medium pebbles; about 20 percent total sand; slightly acid; clear smooth boundary.

Bt5—36 to 47 inches; light brownish gray (2.5YR 6/2) silt loam; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few distinct grayish brown (10YR 5/2) clay films on faces of peds; about 1 percent fine and medium pebbles; about 15 percent total sand; neutral; clear smooth boundary.

BCg—47 to 55 inches; gray (10YR 6/1) silt loam; many coarse prominent yellowish red (5YR 4/6), few medium distinct yellowish brown (10YR 5/6), and few fine faint gray (10YR 5/1) mottles; weak coarse prismatic structure; friable; about 1 percent fine and medium pebbles; about 22 percent total sand; neutral; gradual smooth boundary.

Cg—55 to 60 inches; gray (5Y 6/1) silt loam; common coarse prominent yellowish brown (10YR 5/6) and few fine faint gray (5Y 5/1) mottles; massive; friable; about 2 percent fine and medium pebbles; about 20 percent total sand; neutral.

The solum ranges from about 50 to more than 60 inches in thickness. The Ap or A horizon has value of 4 or 5 and chroma of 2 to 4. It is silt loam in uneroded areas and silty clay loam in eroded areas. Pedons in uneroded areas have an E horizon. This horizon is silt loam. It has the same range of colors as the Ap horizon. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is very strongly acid to medium acid in the upper part and slightly acid to mildly alkaline in the lower part.

Bluford Series

The Bluford series consists of somewhat poorly drained, slowly permeable soils on broad ridges, on knolls, and on side slopes along drainageways in the uplands. These soils formed in about 40 inches of loess and in the underlying silty sediments. Slopes range from 0 to 6 percent.

Bluford soils are similar to Hoyleton and Stoy soils and are commonly adjacent to Ava, Blair, and Wynoose soils. Hoyleton soils have a surface layer that is darker than that of the Bluford soils. Stoy soils have less clay in the subsoil than the Bluford soils. The moderately well drained Ava soils are higher on the ridges. They have a fragipan. Blair soils have more sand in the lower part of the subsoil than the Bluford soils. They are mainly on side slopes near the drainageways. The poorly drained Wynoose soils are on broad upland flats. They have an albic horizon.

Typical pedon of Bluford silt loam, 2 to 4 percent slopes, 1,247 feet west and 634 feet south of the center of sec. 24, T. 5 S., R. 1 W.

Ap—0 to 7 inches; silt loam, brown (10YR 4/3) crushed, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; common fine and medium roots; common fine dark concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

E—7 to 13 inches; yellowish brown (10YR 5/4) silt loam; common fine faint yellowish brown (10YR 5/6) and few fine distinct light brownish gray (10YR 6/2) mottles; weak very fine subangular blocky structure parting to weak fine and very fine granular; friable; common fine and medium roots; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine dark concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Bt1—13 to 18 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine dark concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt2—18 to 26 inches; grayish brown (10YR 5/2) silty clay loam; many coarse distinct dark yellowish brown (10YR 4/4 and 4/6) mottles; moderate medium angular blocky structure parting to moderate fine subangular blocky; friable; few fine roots;

common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt3—26 to 37 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and dark yellowish brown (10YR 4/6) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Btx—37 to 49 inches; yellowish brown (10YR 5/4) silty clay loam; many coarse faint yellowish brown (10YR 5/6) and many medium and coarse distinct pinkish gray (7.5YR 6/2) mottles; weak medium prismatic structure; firm; slightly brittle; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium concretions and accumulations (iron and manganese oxides); few fine pebbles; strongly acid; clear smooth boundary.

2Btb—49 to 60 inches; dark yellowish brown (10YR 4/4) silty clay loam; common coarse faint yellowish brown (10YR 5/6) and common medium and coarse distinct brown (7.5YR 5/2) mottles; weak coarse prismatic structure; friable; few distinct very dark grayish brown (10YR 3/2) clay films and common distinct dark grayish brown (10YR 4/2) coatings on faces of peds; common fine and medium accumulations (iron and manganese oxides); few fine pebbles; medium acid.

The solum ranges from 40 to more than 60 inches in thickness. The depth to the underlying silty sediments ranges from about 30 to more than 45 inches.

The Ap horizon has value of 4 or 5. Pedons in eroded areas commonly do not have an E horizon. The Bt horizon has hue of 10YR in the upper part and hue of 10YR or 2.5Y in the lower part. It has value of 4 to 6 and chroma of 2 to 4. It is silty clay loam or silty clay. It is very strongly acid to medium acid.

Bonnie Series

The Bonnie series consists of poorly drained, moderately slowly permeable soils in low areas on flood plains. These soils formed in acid, silty alluvium. Slopes range from 0 to 2 percent.

Bonnie soils are similar to Belknap soils and are commonly adjacent to Belknap, Hickory, and Karnak soils. The somewhat poorly drained Belknap soils are in the slightly higher areas on the flood plains. The moderately well drained and well drained Hickory soils are on side slopes in the uplands. Karnak soils are silty clay or clay throughout. They are in the lower areas on the flood plains.

Typical pedon of Bonnie silt loam, 2,590 feet south and 59 feet west of the center of sec. 34, T. 6 S., R. 3 W.

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; few fine and medium distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable; common fine roots; common distinct light gray (10YR 7/2 dry) silt coatings; medium acid; clear smooth boundary.

Cg1—6 to 12 inches; light brownish gray (10YR 6/2) silt loam; few fine faint brown (10YR 5/3) and few fine distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; friable; few fine roots; common fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Cg2—12 to 19 inches; thinly stratified light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) silt loam; many medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine and medium black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Cg3—19 to 26 inches; stratified light brownish gray (2.5Y 6/2) silt loam and light gray (10YR 7/2) silt; common fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Cg4—26 to 60 inches; stratified light brownish gray (2.5Y 6/2) silty clay loam and light gray (10YR 7/2) silt; few fine distinct pale brown (10YR 6/3) and few fine prominent reddish yellow (7.5YR 6/6) and strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid.

The control section averages less than 27 percent clay. The Cg horizon has hue of 10YR or 2.5Y.

Cisne Series

The Cisne series consists of poorly drained, very slowly permeable soils on broad flats, in small depressions, and in mine sinks on uplands. These soils formed in loess and in the underlying silty sediments. Slopes range from 0 to 2 percent.

Cisne soils are similar to Oconee, Wagner, and Wynoose soils and are commonly adjacent to Hoyleton, Huey, and Wynoose soils. The somewhat poorly drained Oconee soils are slightly higher on the landscape than the Cisne soils. They formed entirely in loess and are not characterized by an abrupt textural change. Wagner soils formed in a thin mantle of loess and in the underlying clayey lacustrine sediments. They are on low terraces.

Wynoose soils have a surface layer that is lighter colored than that of the Cisne soils. The somewhat poorly drained Hoyleton soils are in the slightly higher positions on the landscape. Huey soils have a natric horizon. They are intricately mixed with areas of the Cisne soils.

Typical pedon of Cisne silt loam, 1,676 feet east and 62 feet south of the center of sec. 10, T. 4 S., R. 2 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; few fine prominent strong brown (7.5YR 5/6) mottles; weak medium granular structure; friable; common fine roots; mildly alkaline; abrupt smooth boundary.

E1—8 to 11 inches; grayish brown (10YR 5/2) silt loam; common medium prominent brown (7.5YR 4/4) mottles; weak very thick platy structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few medium black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear smooth boundary.

E2—11 to 20 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent brown (7.5YR 4/4) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable; few fine roots; few fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Btg1—20 to 26 inches; grayish brown (10YR 5/2) silty clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many prominent dark grayish brown (10YR 4/2) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; few medium black (10YR 2/1) and strong brown (7.5YR 5/8) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg2—26 to 33 inches; light brownish gray (10YR 6/2) silty clay; common medium prominent strong brown (7.5YR 5/6) and few fine prominent yellowish red (5YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg3—33 to 40 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to moderate coarse angular blocky; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many distinct white (10YR 8/1 dry) silt coatings in a 1.5-inch band in the lower part; common coarse black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg4—40 to 51 inches; grayish brown (10YR 5/2) and pale brown (10YR 6/3) silty clay loam; common medium prominent strong brown (7.5YR 5/8) and few medium prominent yellowish red (5YR 5/8) mottles; weak coarse prismatic structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many medium black (10YR 2/1) concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

2BCg—51 to 60 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent yellowish red (5YR 5/6 and 5/8) mottles; weak coarse prismatic structure; friable; few distinct grayish brown (10YR 5/2) clay films on vertical faces of peds; about 15 percent sand; slightly acid.

The thickness of the solum and the depth to free carbonates are commonly more than 60 inches. The loess ranges from about 40 to more than 60 inches in thickness.

The Ap horizon has value of 2 or 3. The E horizon has value of 5 or 6. The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It has mottles with the same hue or redder hue and with higher chroma. It is medium acid or very strongly acid. The content of clay in this horizon ranges from 35 to 45 percent. The 2BCg horizon has a higher content of fine sand than the Bt horizon. It has hue of 10YR or 2.5Y and value of 5 or 6. It is strongly acid to slightly acid.

Colp Series

The Colp series consists of moderately well drained, slowly permeable soils on ridges and side slopes on terraces. These soils formed in a thin mantle of loess or silty sediments and in the underlying silty or clayey lacustrine sediments. Slopes range from 2 to 7 percent.

Colp soils are similar to Hurst soils and are commonly adjacent to Belknap, Bonnie, Hurst, and Okaw soils. The somewhat poorly drained Hurst and poorly drained Okaw soils are on the less sloping parts of the terraces. The somewhat poorly drained Belknap and poorly drained Bonnie soils are on flood plains below the Colp soils.

Typical pedon of Colp silt loam, 2 to 7 percent slopes, eroded, 540 feet east and 430 feet north of the center of sec. 25, T. 6 S., R. 3 W.

Ap—0 to 6 inches; mixed dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.

BE—6 to 8 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots; common distinct very

pale brown (10YR 7/4) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

2Bt1—8 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; many fine faint yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; common very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; few fine concretions (iron and manganese oxides); common very fine roots; very strongly acid; clear smooth boundary.

2Bt2—12 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) and distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common distinct brown (10YR 4/3) clay films on faces of peds; few very fine roots; very strongly acid; clear smooth boundary.

2Bt3—20 to 27 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6), common medium faint light brownish gray (10YR 6/2), and few fine prominent yellowish red (5YR 5/8) mottles; weak medium prismatic structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few very fine roots; 1/8-inch-thick horizontal band of yellowish brown (10YR 5/6) loamy sand at a depth of about 24 inches; very strongly acid; clear smooth boundary.

2Btg1—27 to 34 inches; mottled light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/4 and 5/6) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium concretions in the upper part and few fine concretions in the lower part (iron and manganese oxides); few distinct white (10YR 8/1 dry) splotches; slightly acid; gradual smooth boundary.

2Btg2—34 to 42 inches; grayish brown (2.5Y 5/2) silty clay; common fine distinct yellowish brown (10YR 5/4) and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium and fine subangular blocky; firm; few fine roots; common distinct gray (5Y 5/1) clay films on faces of peds; few medium concretions (iron and manganese oxides); few distinct white (10YR 8/1 dry) splotches; mildly alkaline; clear smooth boundary.

2BCg—42 to 60 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; common medium concretions (calcium carbonate); strong effervescence; moderately alkaline.

The solum ranges from 35 to more than 60 inches in thickness. The thickness of the loess commonly ranges from 8 to 20 inches but is less than 8 inches in some severely eroded areas.

The Ap horizon has chroma of 2 or 3. The 2Bt horizon has hue of 10YR or 2.5Y and chroma of 2 to 4. It is silty clay or silty clay loam. The content of clay ranges from 35 to 60 percent in the control section.

Darmstadt Series

The Darmstadt series consists of somewhat poorly drained, very slowly permeable soils on broad ridges, on side slopes at the upper end of drainageways, and in mine sinks on uplands. These soils have a natric horizon. They formed in loess and or in loess and the underlying silty sediments. Slopes range from 0 to 6 percent.

Darmstadt soils are similar to Huey and Tamalco soils and are commonly adjacent to Cisne, Hoyleton, Oconee, and Tamalco soils. Huey soils are poorly drained. The moderately well drained Tamalco soils are on the higher knolls. Cisne, Hoyleton, and Oconee soils do not have a natric horizon. The poorly drained Cisne and somewhat poorly drained Hoyleton soils are in landscape positions similar to those of the Darmstadt soils, and the nearly level Oconee soils are on broad uplands. Hoyleton and Oconee soils have a surface layer that is darker than that of the Darmstadt soils.

Typical pedon of Darmstadt silt loam, in an area of Hoyleton-Darmstadt silt loams, 0 to 2 percent slopes, 1,250 feet east and 440 feet north of the center of sec. 15, T. 6 S., R. 4 W.

Ap—0 to 8 inches; silt loam, dark grayish brown (10YR 4/2) crushed, light brownish gray (10YR 6/2) dry; weak thin platy structure parting to weak fine granular; friable; common fine roots; neutral; clear smooth boundary.

E1—8 to 13 inches; grayish brown (10YR 5/2) silt loam, brown (10YR 4/3) crushed; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium platy structure parting to moderate fine granular; friable; common fine roots; neutral; abrupt smooth boundary.

E2—13 to 18 inches; light brownish gray (10YR 6/2) silt loam; few fine distinct yellowish brown (10YR 5/6) and common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate thick platy structure parting to moderate medium granular; friable; common fine roots; many fine black (10YR 2/1) concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

Bt1—18 to 23 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to moderate medium angular and subangular blocky;

firm; common fine roots; common distinct dark gray (10YR 4/1) clay films and many distinct grayish brown (10YR 5/2) silt coatings on faces of peds; common fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt2—23 to 29 inches; pale brown (10YR 6/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Btgn1—29 to 35 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels; few distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium black (10YR 2/1) concretions (iron and manganese oxides); mildly alkaline; clear smooth boundary.

Btgn2—35 to 44 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; few distinct grayish brown (10YR 5/2) clay films on faces of peds; many coarse black (10YR 2/1) concretions (iron and manganese oxides); moderately alkaline; gradual smooth boundary.

Btgn3—44 to 57 inches; light brownish gray (2.5Y 6/2) silt loam; many medium prominent brown (7.5YR 4/4) mottles; weak coarse prismatic structure; friable; few distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium black (10YR 2/1) concretions (iron and manganese oxides); a large concretion of calcium carbonate at a depth of about 57 inches; strongly alkaline; gradual smooth boundary.

2BCgn—57 to 60 inches; light brownish gray (10YR 6/2) silt loam; common coarse prominent brown (7.5YR 4/4) and common medium and coarse prominent yellowish red (5YR 4/6) mottles; weak coarse prismatic structure; friable; common medium black (10YR 2/1) concretions (iron and manganese oxides); strongly alkaline.

The solum ranges from 48 to more than 60 inches in thickness. The depth to a sodium concentration of 15 percent or more is commonly about 30 inches but ranges from 24 to 36 inches.

The Ap horizon has value of 4 to 6 and chroma of 2 or 3. The E horizon has value of 4 to 6. Pedons in eroded areas commonly do not have an E horizon. The Bt and Btgn horizons have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3.

Hickory Series

The Hickory series consists of moderately well drained and well drained, moderately permeable soils on side slopes along drainageways in the uplands. These soils formed in a thin mantle of loess and the underlying Illinoian glacial till or entirely in glacial till. Slopes range from 10 to 60 percent.

Hickory soils are similar to Wellston soils and are commonly adjacent to Ava, Hosmer, and Wellston soils. Ava and Hosmer soils are upslope from the Hickory soils. Ava soils formed in about 3 feet of loess and in the underlying silty sediments. Hosmer soils formed entirely in loess. Wellston soils formed in silty and loamy material over shale and sandstone. They are on side slopes below the Hickory soils.

Typical pedon of Hickory silt loam, 30 to 60 percent slopes, 1,320 feet south and 1,300 feet west of the northeast corner of sec. 17, T. 4 S., R. 3 W.

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few very fine roots; neutral; abrupt smooth boundary.

E—1 to 4 inches; brown (10YR 5/3) silt loam; few fine yellowish brown (10YR 5/6) peds of material from the B horizon; weak fine subangular blocky structure parting to weak fine granular; friable; few very fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine concretions (iron and manganese oxides); few coarse pebbles; slightly acid; clear smooth boundary.

Bt1—4 to 9 inches; yellowish brown (10YR 5/4) clay loam; weak fine and medium subangular blocky structure; friable; few very fine roots; few distinct brown (10YR 5/3) clay films on faces of peds; few fine concretions (iron and manganese oxides); few coarse pebbles; medium acid; clear smooth boundary.

Bt2—9 to 17 inches; yellowish brown (10YR 5/6) clay loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; few fine concretions (iron and manganese oxides); common medium pebbles; very strongly acid; gradual smooth boundary.

Bt3—17 to 32 inches; yellowish brown (10YR 5/6) clay loam; weak fine and medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine concretions (iron and manganese oxides); common

medium and coarse pebbles; very strongly acid; gradual smooth boundary.

Bt4—32 to 39 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine concretions (iron and manganese oxides); few fine pebbles; strongly acid; clear smooth boundary.

Bt5—39 to 60 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct strong brown (7.5YR 5/8) mottles; weak medium prismatic structure; friable; few very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; few medium concretions (iron and manganese oxides); few coarse pebbles; medium acid.

The A or Ap horizon has value and chroma of 2 to 6. It is silt loam or loam in uneroded areas and silty clay loam or clay loam in eroded areas. The E horizon has value of 4 to 6 and chroma of 2 to 4. Pedons in eroded areas commonly do not have an E horizon. The Bt horizon is clay loam, silty clay loam, or sandy loam. It has value and chroma of 4 to 6 in the upper part and has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6 in the lower part. It ranges from very strongly acid to neutral.

Hosmer Series

The Hosmer series consists of moderately well drained soils on ridges and convex side slopes along upland drainageways. These soils formed in loess. Permeability is moderate in the upper part of the profile and very slow in the lower part. Slopes range from 2 to 18 percent.

The Hosmer soils in this survey area are taxadjuncts to the series because the Bx horizon, which has moderate medium subangular blocky structure, does not qualify as a fragipan. This difference, however, does not significantly affect the usefulness or behavior of the soils.

Hosmer soils are similar to Ava soils and are commonly adjacent to Blair, Hickory, Stoy, and Weir soils. Ava soils formed in about 3 feet of loess and in the underlying silty sediments. The somewhat poorly drained Blair soils formed in loess and silty sediments over a paleosol that formed in glacial till. They are mainly on side slopes along upland drainageways below the Hosmer soils. Hickory soils formed primarily in glacial till and are on side slopes below the Hosmer soils. The somewhat poorly drained Stoy soils are commonly on the less sloping ridges and convex side slopes along upland drainageways. The poorly drained Weir soils are on broad upland flats or in depressions.

Typical pedon of Hosmer silt loam, 2 to 5 percent slopes, 680 feet south and 86 feet west of the northeast corner of sec. 19, T. 5 S., R. 3 W.

Ap—0 to 7 inches; silt loam, brown (10YR 4/3) crushed, yellowish brown (10YR 5/4) dry; few fine faint dark yellowish brown (10YR 4/4) stains; weak fine and medium granular structure; friable; common very fine and fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

E—7 to 10 inches; yellowish brown (10YR 5/4) silt loam; few brown (10YR 4/3) streaks of material from the Ap horizon; weak medium subangular blocky structure; friable; common very fine and fine roots; few fine dark concretions (iron and manganese oxides); neutral; clear smooth boundary.

Bt—10 to 17 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; common very fine and fine roots; common distinct brown (10YR 5/3) clay films and few distinct pale brown (10YR 6/3) silt coatings on faces of peds; common fine dark concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

B/E—17 to 20 inches; yellowish brown (10YR 5/4) silty clay loam (B); common fine distinct dark yellowish brown (10YR 5/8) mottles; moderate very fine and fine subangular blocky structure; light gray (10YR 7/2) silt (E) occurring as many prominent coatings on faces of peds and as fillings in spaces between peds; friable; common very fine and fine roots; common distinct brown (10YR 4/3) and dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

B't1—20 to 29 inches; yellowish brown (10YR 5/6) silty clay loam; common fine and medium distinct grayish brown (10YR 5/2) and common fine faint yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few very fine and fine roots; many distinct brown (10YR 5/3) clay films and common distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

B't2—29 to 36 inches; mottled yellowish brown (10YR 5/6 and 5/8) and grayish brown (10YR 5/2) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; few very fine roots; common distinct brown (10YR 4/3) clay films and common distinct light gray (10YR 7/2) silt coatings on faces of peds; common fine dark accumulations (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Btx—36 to 50 inches; mottled yellowish brown (10YR 5/4 and 5/8), light brownish gray (10YR 6/2), and dark yellowish brown (10YR 4/4) silty clay loam;

moderate medium prismatic structure parting to weak medium subangular blocky; slightly brittle; few very fine roots; few distinct brown (10YR 5/3) clay films and few distinct light gray (10YR 7/2) silt coatings on faces of peds; common fine dark accumulations (iron and manganese oxides); very strongly acid; gradual smooth boundary.

BC—50 to 60 inches; mottled yellowish brown (10YR 5/6 and 5/8) and light brownish gray (10YR 6/2) silt loam; weak medium prismatic structure; friable; few distinct dark yellowish brown (10YR 4/4) stains and common fine dark accumulations (iron and manganese oxides); very strongly acid.

The solum ranges from 50 to more than 60 inches in thickness. The depth to the Btx horizon ranges from 20 to 40 inches.

The A or Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is dominantly silt loam but is silty clay loam in severely eroded areas. The E horizon is 2 to 6 inches thick in uneroded areas and less than 2 inches thick in some eroded areas. It has value of 4 or 5 and chroma of 4 to 6. The Bt and B't horizons have value of 5 or 6 and chroma of 3 to 6. They are medium acid to very strongly acid.

Hoyleton Series

The Hoyleton series consists of somewhat poorly drained, slowly permeable soils on broad ridges, on knolls, on side slopes along drainageways, and in mine sinks on uplands. These soils formed in loess and in the underlying silty sediments. Slopes range from 0 to 6 percent.

Hoyleton soils are similar to Bluford and Oconee soils and are commonly adjacent to Bluford, Cisne, Darmstadt, and Tamalco soils. Bluford, Darmstadt, and Tamalco soils have a surface layer that is lighter colored than that of the Hoyleton soils. Bluford and Darmstadt soils are in landscape positions similar to those of the Hoyleton soils, but Bluford soils are commonly nearer to drainageways. Darmstadt and Tamalco soils have a natric horizon. Tamalco soils are on the slightly higher knolls and ridges. Oconee soils formed entirely in loess. The poorly drained Cisne soils are on the slightly lower broad flats.

Typical pedon of Hoyleton silt loam, 2 to 4 percent slopes, 540 feet east and 177 feet south of the northwest corner of sec. 24, T. 4 S., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few very fine and fine roots; few fine concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

E—9 to 12 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak thick platy structure parting to moderate medium granular; friable; few very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Bt1—12 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; common medium prominent red (2.5YR 4/6) and few fine distinct grayish brown (10YR 5/2) mottles; moderate very fine subangular blocky structure; friable; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films and few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt2—15 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and many medium prominent red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films and few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine concretions (iron and manganese oxides); strongly acid; gradual smooth boundary.

Bt3—20 to 27 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many distinct brown (10YR 4/3) clay films on vertical faces of peds and common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt4—27 to 36 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent brown (7.5YR 4/4) and few medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few distinct dark grayish brown (10YR 4/2) clay films on vertical faces of peds and common distinct black (10YR 2/1) clay films in old root channels; few fine and medium concretions (iron and manganese oxides); medium acid; gradual smooth boundary.

Bt5—36 to 47 inches; mottled light brownish gray (10YR 6/2), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/6) silt loam; weak medium prismatic structure; friable; few distinct grayish brown (10YR 5/2) clay films on vertical faces of peds and common distinct black (10YR 2/1) clay films in old root channels; few fine concretions (iron and manganese oxides); slightly acid; gradual smooth boundary.

2BC—47 to 60 inches; mottled grayish brown (10YR 5/2), brown (10YR 5/3), strong brown (7.5YR 5/8), and dark yellowish brown (10YR 4/4) silt loam; weak coarse prismatic structure; friable; few fine concretions (iron and manganese oxides); neutral.

The solum is commonly more than 60 inches thick but is as thin as 40 inches in some pedons. The loess is commonly about 48 inches thick, but it ranges from about 40 to more than 55 inches in thickness.

The Ap horizon has chroma of 2 or 3. The E horizon has value of 5 or 6 and chroma of 3 or 4. Pedons in some eroded areas do not have an E horizon. The Bt horizon has value of 5 or 6 and chroma of 2 to 4. In the upper part it commonly has mottles with hue redder than 10YR. It is dominantly silty clay loam or silty clay in which the content of clay is 35 to 45 percent. In some pedons, however, this horizon is silt loam in the lower part. It ranges from slightly acid to very strongly acid. The 2BC horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. It is silt loam or silty clay loam and has a higher content of fine sand than the Bt horizon.

Huey Series

The Huey series consists of poorly drained, very slowly permeable soils on uplands. These soils have a natric horizon. They formed in about 48 inches of loess and in the underlying silty sediments. Slopes range from 0 to 2 percent.

Huey soils are similar to Darmstadt soils and are commonly adjacent to Cisne, Darmstadt, and Oconee soils. The somewhat poorly drained Darmstadt soils are slightly higher on the landscape than the Huey soils. Cisne and Oconee soils have a surface layer that is darker than that of the Huey soils. Cisne soils do not have a natric horizon. They are in landscape positions similar to those of the Huey soils. The somewhat poorly drained Oconee soils are on broad, low ridges above the Huey soils.

Typical pedon of Huey silt loam, in an area of Cisne-Huey silt loams, 815 feet east and 105 feet north of the center of sec. 23, T. 4 S., R. 4 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few very fine and fine roots; few distinct white (10YR 8/2 dry) and many distinct very dark grayish brown (10YR 3/2) coatings on faces of peds; few fine concretions (iron and manganese oxides); exchangeable sodium percentage of about 17; neutral; abrupt smooth boundary.

E—9 to 12 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; few fine faint yellowish brown (10YR 5/6) mottles; weak thick platy structure parting to weak fine granular; friable; few very fine and fine roots; few prominent light gray (10YR 7/2 dry) silt coatings on faces of peds; exchangeable sodium percentage of about 21; slightly acid; clear smooth boundary.

Bt—12 to 15 inches; grayish brown (10YR 5/2) silt loam; few fine distinct brown (10YR 4/3) and common fine distinct dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; friable; few very fine roots; common distinct light gray (10YR 7/2) and few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; exchangeable sodium percentage of about 19; slightly acid; clear smooth boundary.

Btn1—15 to 22 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; weak fine prismatic structure parting to weak fine and medium subangular blocky; firm; few very fine roots; many distinct dark gray (10YR 4/1) and very dark grayish brown (10YR 3/2) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; exchangeable sodium percentage of about 20; mildly alkaline; clear smooth boundary.

Btn2—22 to 27 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct strong brown (7.5YR 5/8) and common fine faint yellowish brown (10YR 5/4) mottles; weak medium prismatic structure; firm; common distinct gray (10YR 5/1) clay films and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few medium concretions (iron and manganese oxides); exchangeable sodium percentage of about 22; slight effervescence; moderately alkaline; gradual smooth boundary.

Btn3—27 to 35 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; few distinct gray (10YR 5/1) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine concretions (iron and manganese oxides); exchangeable sodium percentage of about 19; strong effervescence; moderately alkaline; gradual smooth boundary.

Btn4—35 to 45 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure; firm; few distinct gray (10YR 5/1) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common medium concretions (iron and manganese oxides); exchangeable sodium percentage of about of 14; strong effervescence; moderately alkaline; gradual smooth boundary.

BCgn—45 to 60 inches; gray (5Y 6/1) silty clay loam; many medium prominent strong brown (7.5YR 5/6)

mottles; weak coarse prismatic structure; friable; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine concretions (iron and manganese oxides); exchangeable sodium percentage of about 23; slight effervescence; moderately alkaline.

The solum ranges from 50 to more than 60 inches in thickness. The loess ranges from 45 to more than 60 inches in thickness.

The E horizon has value of 4 or 5 and chroma of 2. Some pedons do not have an E horizon. The Btn horizon has an exchangeable sodium percentage of more than 15. It has value of 4 or 5. It is silty clay loam or silty clay. The Bt horizon generally is mildly alkaline or moderately alkaline, but the upper part ranges to medium acid. Most pedons have free carbonates.

Hurst Series

The Hurst series consists of somewhat poorly drained, very slowly permeable soils on stream terraces. These soils formed in a thin mantle of loess and in the underlying lacustrine sediments, which are dominantly clayey. Slopes range from 0 to 2 percent.

Hurst soils are similar to Bluford and Colp soils and are commonly adjacent to Colp, Okaw, and Wagner soils. Bluford soils formed in about 40 inches of loess and in the underlying silty sediments. They are on uplands. The moderately well drained Colp and poorly drained Okaw soils are in a drainage sequence with the Hurst soils. Colp soils are higher on the terraces than the Hurst soils, and Okaw soils are lower. The poorly drained Wagner soils are lower on the terraces than the Hurst soils. Also, they have a darker surface layer.

Typical pedon of Hurst silt loam, 1,190 feet east and 1,360 feet south of the northwest corner of sec. 25, T. 6 S., R. 3 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; few very fine and fine roots; few medium concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

E—8 to 15 inches; light gray (10YR 7/2) silt loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak thick platy structure parting to moderate medium granular; friable; few very fine and fine roots; common distinct white (10YR 8/1 dry) silt coatings on faces of peds; few medium concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

2Bt1—15 to 26 inches; brown (10YR 5/3) silty clay; common medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine and fine roots; common distinct dark grayish brown (10YR 4/2) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Bt2—26 to 32 inches; mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/4 and 5/6) silty clay; weak medium prismatic structure parting to weak coarse subangular blocky; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Bt3—32 to 41 inches; yellowish brown (10YR 5/4) silty clay; common fine distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

2BCg—41 to 49 inches; light olive gray (5Y 6/2) silty clay loam; weak coarse prismatic structure; firm; few very fine roots in the upper part and few medium roots in the lower part; few distinct grayish brown (2.5Y 5/2) clay films and many distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); neutral; clear smooth boundary.

2Cg—49 to 60 inches; grayish brown (10YR 5/2) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; few very fine roots; many medium dark concretions (iron and manganese oxides) and few medium light colored concretions (calcium carbonate); strong effervescence; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The mantle of loess ranges from 12 to 20 inches in thickness. The Ap or A horizon has value of 4 or 5. The 2Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is silty clay or silty clay loam.

Karnak Series

The Karnak series consists of poorly drained, slowly permeable and very slowly permeable soils on low flood plains. These soils formed in clayey slack-water sediments. Slopes range from 0 to 2 percent.

Karnak soils are commonly adjacent to Belknap, Bonnie, and Okaw soils. The somewhat poorly drained Belknap and poorly drained Bonnie soils are slightly higher on the flood plains than the Karnak soils. Also, they have less clay and are more acid throughout. Okaw soils formed in loess and in the underlying clayey lacustrine sediments and are acid. They are on low terraces.

Typical pedon of Karnak silty clay, 1,600 feet north and 1,000 feet west of the southeast corner of sec. 30, T. 6 S., R. 2 W.

Ap—0 to 3 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; few very fine roots; neutral; abrupt smooth boundary.

Bg1—3 to 9 inches; gray (10YR 5/1) silty clay; common fine distinct dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; firm; few very fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds in the upper part, few in the lower part; medium acid; clear smooth boundary.

Bg2—9 to 23 inches; gray (10YR 5/1) silty clay; common fine prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; few very fine roots; common distinct dark gray (10YR 4/1) faces of peds; common fine and medium dark concretions (iron and manganese oxides); strongly acid; gradual smooth boundary.

Bg3—23 to 36 inches; gray (10YR 5/1) and dark gray (10YR 4/1) silty clay; common fine prominent strong brown (7.5YR 4/6) mottles; weak coarse prismatic structure; firm; common fine and medium concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Cg—36 to 60 inches; light brownish gray (2.5Y 6/2) silty clay; few fine prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 4/6) mottles; massive; firm; few distinct very dark grayish brown (10YR 3/2) smears; common medium concretions (iron and manganese oxides); slightly acid.

The solum ranges from 30 to 60 inches in thickness. The Ap horizon has value of 3 or 4 and chroma of 1 or 2. The Bg horizon has value of 4 or 5. It has mottles with hue of 10YR or 7.5YR and chroma of more than 1. It is medium acid or strongly acid.

Lenzburg Series

The Lenzburg series consists of well drained soils in areas on uplands that formerly were surface mined. These soils formed in a regolith of cast overburden. The regolith is dominantly fine-earth material that has till pebbles or fragments of shale, limestone, and sandstone. Permeability is moderately slow. Slopes range from 2 to 60 percent.

Lenzburg soils are similar to Morristown and Schuline soils and are commonly adjacent to Morristown, Schuline, and Swanwick soils. Morristown soils are on the steeper side slopes. The content of rock fragments in their control section is more than 35 percent. The content of coarse fragments throughout Schuline and Swanwick soils is less than 15 percent. These soils are in gently sloping and sloping areas where the surface soil material has been replaced.

Typical pedon of Lenzburg gravelly silty clay loam, 20 to 60 percent slopes, stony, 2,280 feet west and 100 feet south of the center of sec. 10, T. 6 S., R. 3 W.

A—0 to 3 inches; very dark gray (10YR 3/1) and dark yellowish brown (10YR 4/4) gravelly silty clay loam, gray (10YR 5/1) and light yellowish brown (10YR 6/4) dry; weak coarse granular structure; friable; common fine and medium roots; about 20 percent coarse fragments of coal, sandstone, shale, and limestone; strong effervescence; moderately alkaline; abrupt irregular boundary.

C1—3 to 16 inches; gray (10YR 6/1) and yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; firm; few fine and medium roots; about 4 percent coarse fragments; slight effervescence; moderately alkaline; gradual smooth boundary.

C2—16 to 26 inches; brown (7.5YR 5/2) and yellowish brown (10YR 5/6) silty clay loam; few medium distinct dark brown (7.5YR 4/4) mottles; massive; firm; few very fine and medium roots; about 6 percent coarse fragments; common pockets of black (N 2/0) clayey shale approximately 1 inch across; slight effervescence; mildly alkaline; clear irregular boundary.

C3—26 to 60 inches; mixed yellowish brown (10YR 5/6) and gray (10YR 6/1) gravelly silty clay loam; massive; firm; few very fine and fine roots; about 30 percent coarse fragments of weathered and unweathered shale; strong effervescence; moderately alkaline.

The depth to bedrock is more than 5 feet. The content of rock fragments in the control section averages about 20 percent and ranges from 15 to 35 percent. The rock fragments are disordered relative to any plane in the profile. They commonly are less than 10 inches in size, but some pedons have stones and small boulders more than 10 inches in size.

The A horizon has value of 3 or 4 and chroma of 1 to 4. It is silty clay loam, clay loam, or the gravelly or stony analogs of these textures. It is mildly alkaline or moderately alkaline. The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 8. It is clay loam, silty clay loam, or the gravelly analogs of these textures. It is mildly alkaline or moderately alkaline to a depth of at least 40 inches. In some pedons it is extremely acid below a depth of about 50 inches.

Morristown Series

The Morristown series consists of well drained, moderately slowly permeable soils in areas that formerly

were surface mined. These soils formed in a regolith of cast overburden. The regolith is dominantly fine-earth material that has till pebbles or large fragments of shale, limestone, and sandstone. Slopes range from 20 to 60 percent.

Morristown soils are similar to Lenzburg soils and are commonly adjacent to Lenzburg, Schuline, and Swanwick soils. The content of rock fragments in the control section of the adjacent soils is less than 35 percent. The gently sloping to steep Lenzburg soils are on side slopes. The gently sloping and sloping Schuline and Swanwick soils are in areas where surface soil material has been replaced.

Typical pedon of Morristown cobbly silty clay loam, 20 to 60 percent slopes, very stony, 280 feet west and 1,200 feet south of the northeast corner of sec. 12, T. 6 S., R. 2 W.

Ap—0 to 2 inches; yellowish brown (10YR 5/4) cobbly silty clay loam; weak fine granular structure; friable; many very fine and fine roots between peds; common prominent very dark grayish brown (10YR 3/2) coatings on faces of peds; about 45 percent rock fragments consisting of 50 percent stones, 20 percent cobbles, 20 percent gravel, and 10 percent boulders; moderately alkaline; clear irregular boundary.

AC—2 to 6 inches; yellowish brown (10YR 5/4) cobbly clay loam; few fine prominent strong brown (7.5YR 5/8), common fine and medium faint grayish brown (10YR 5/2), and common fine faint yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; many very fine and fine roots in peds and few medium roots between peds; few faint dark brown (10YR 3/3) coatings on faces of peds; about 37 percent rock fragments consisting of 50 percent stones, 25 percent cobbles, and 25 percent boulders; strong effervescence; moderately alkaline; clear irregular boundary.

C—6 to 60 inches; brownish yellow (10YR 6/6) very bouldery clay loam; few fine distinct brown (10YR 5/3) mottles; massive; friable; common very fine and few fine roots between peds to a depth of about 24 inches; about 39 percent rock fragments consisting of 40 percent boulders, 30 percent stones, 15 percent cobbles, and 15 percent gravel; strong effervescence; moderately alkaline.

The depth to bedrock is more than 5 feet. Rock fragments cover as much as 3 percent of the surface and are throughout the profile. The content of rock fragments in the control section averages about 39 percent and ranges from 35 to 60 percent. The rock fragments are disordered relative to any plane in the profile. They commonly are less than 4 feet in size, but some pedons have boulders more than 4 feet in size.

The Ap or A horizon has value of 3 to 5 and chroma of 1 to 4. It is clay loam, silty clay loam, or the cobbly or stony analogs of these textures. It is mildly alkaline or moderately alkaline. The C horizon also is mildly alkaline or moderately alkaline. It has hue of 10YR, 5Y, or 2.5Y, value of 4 to 6, and chroma of 1 to 6. It is clay loam, silty clay loam, or the gravelly to very bouldery analogs of these textures.

Oconee Series

The Oconee series consists of somewhat poorly drained, slowly permeable soils on broad uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Oconee soils are similar to Cisne and Hoyleton soils and are commonly adjacent to Cisne and Darmstadt soils. The poorly drained Cisne soils are on the slightly lower broad flats. Hoyleton soils have a mantle of loess that is thinner than that of the Oconee soils. Darmstadt soils have a natric horizon and have a surface layer that is lighter colored than that of the Oconee soils. They are intricately mixed with areas of the Oconee soils.

Typical pedon of Oconee silt loam, 2,000 feet west and 93 feet south of the center of sec. 19, T. 4 S., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; few fine prominent strong brown (7.5YR 5/6) mottles; moderate fine granular structure; friable; few very fine roots; mildly alkaline; abrupt smooth boundary.

E1—9 to 13 inches; grayish brown (10YR 5/2) silt loam; weak medium platy structure parting to moderate fine granular; friable; few very fine roots; few faint light gray (10YR 7/2 dry) silt coatings on faces of peds; neutral; clear smooth boundary.

E2—13 to 16 inches; pale brown (10YR 6/3) silt loam; few medium distinct grayish brown (10YR 5/2) and few fine prominent reddish brown (5YR 5/4) mottles; moderate medium platy structure parting to moderate fine granular; friable; few very fine roots; neutral; clear smooth boundary.

Bt1—16 to 23 inches; brown (10YR 5/3) silty clay loam; common medium prominent red (2.5YR 4/6) and common medium faint grayish brown (10YR 5/2) mottles; strong very fine and fine prismatic structure parting to moderate fine subangular and angular blocky; firm; few very fine roots; many prominent dark grayish brown (10YR 4/2) clay films and common distinct white (10YR 8/1 dry) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—23 to 28 inches; brown (10YR 5/3) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few very fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine and medium black (10YR 2/1)

concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg1—28 to 35 inches; light brownish gray (10YR 6/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm; few very fine roots; common prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); strongly acid; gradual smooth boundary.

Btg2—35 to 43 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); slightly acid; gradual smooth boundary.

BCg—43 to 53 inches; grayish brown (10YR 5/2) silt loam; few medium distinct brownish yellow (10YR 6/8) and common medium prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; neutral; gradual smooth boundary.

Cg—53 to 60 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) and common medium prominent yellowish red (5YR 5/6) mottles; massive; friable; neutral.

The solum ranges from 40 to 60 inches in thickness. The E horizon has value of 5 or 6 and chroma of 2 or 3. The Bt and Btg horizons have value of 5 or 6 and chroma of 2 or 3. They are silty clay loam or silty clay. They range from slightly acid to very strongly acid.

Okaw Series

The Okaw series consists of poorly drained, very slowly permeable soils on stream terraces. These soils formed in a thin mantle of loess and in the underlying clayey lacustrine sediments. Slopes range from 0 to 2 percent.

Okaw soils are similar to Cisne, Wagner, and Wynoose soils and are commonly adjacent to Colp, Hurst, and Wagner soils. Cisne and Wagner soils have a surface layer that is darker than that of the Okaw soils. Wagner soils are in landscape positions similar to those of the Okaw soils. Cisne and Wynoose soils are on uplands and are not subject to flooding. The moderately well drained Colp and somewhat poorly drained Hurst soils form a drainage sequence with the Okaw soils. They are in the higher positions on the terraces.

Typical pedon of Okaw silt loam, 140 feet west and 1,240 feet north of the southeast corner of sec. 25, T. 6 S., R. 3 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium granular structure; friable; few very fine roots; common prominent white (10YR 8/1 dry) and light gray (10YR 7/2 dry) silt coatings on faces of peds; common medium concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

E—7 to 11 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent strong brown (7.5YR 5/8) and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to weak medium granular; friable; few very fine and fine roots; common prominent white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

2Btg1—11 to 17 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent yellowish brown (10YR 5/8) mottles; moderate fine and medium subangular blocky structure; firm; few very fine and fine roots; few distinct dark grayish brown (10YR 4/2) clay films and many prominent white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Btg2—17 to 28 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/6) and few fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine and fine roots; common distinct dark grayish brown (10YR 4/2) clay films and many prominent white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2Btg3—28 to 37 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to weak medium and coarse subangular blocky; firm; few very fine and fine roots; common distinct dark grayish brown (10YR 4/2) clay films and common distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Btg4—37 to 53 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/6) and distinct olive yellow (2.5Y 6/6) mottles; weak coarse prismatic structure; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films; few distinct yellow (2.5Y 8/6) coatings on faces of peds; many fine and medium concretions (iron and manganese oxides); medium acid; gradual smooth boundary.

2Cg—53 to 60 inches; grayish brown (2.5Y 5/2) silty clay; many medium prominent yellowish brown

(10YR 5/6) mottles; weak medium subangular blocky structure; firm; many fine and medium concretions (iron and manganese oxides); neutral.

The solum ranges from 45 to 60 inches in thickness. The loess ranges from 8 to 20 inches in thickness.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The 2Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is very strongly acid to medium acid.

Richview Series

The Richview series consists of moderately well drained, moderately permeable soils on knobs and ridges in the uplands. These soils formed in loess and in the underlying silty and loamy sediments. Slopes range from 2 to 10 percent.

Richview soils are commonly adjacent to Ava, Hosmer, and Hoyleton soils. Ava and Hosmer soils have a surface layer that is lighter colored than that of the Richview soils and have a Btx horizon. They are in landscape positions similar to those of the Richview soils or are on the more sloping knobs and ridges in the uplands. The somewhat poorly drained Hoyleton soils are on the broader upland ridges and on side slopes along drainageways.

Typical pedon of Richview silt loam, 2 to 5 percent slopes, 270 feet east and 750 feet north of the center of sec. 18, T. 6 S., R. 2 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 11 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; common distinct dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—11 to 19 inches; brown (7.5YR 4/4) silty clay loam; few fine prominent red (2.5YR 4/6) and few fine faint strong brown (7.5YR 4/6) mottles; moderate fine and medium subangular blocky structure; friable; common fine roots; many distinct dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine concretions (iron and manganese oxides); neutral; clear smooth boundary.

Bt3—19 to 25 inches; brown (7.5YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/8) and few fine faint strong brown (7.5YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable; common fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few medium concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Bt4—25 to 32 inches; brown (7.5YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; common distinct dark brown (7.5YR 3/4) clay films on faces of peds; common medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt5—32 to 37 inches; brown (7.5YR 4/4) silty clay loam; common medium faint strong brown (7.5YR 4/6) mottles; moderate coarse subangular blocky structure; friable; common fine roots; common distinct brown (7.5YR 4/2) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

2Bt6—37 to 54 inches; strong brown (7.5YR 4/6) silt loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; common fine roots; few distinct brown (7.5YR 4/2) clay films and common distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); about 11 percent sand; few fine pebbles; very strongly acid; gradual smooth boundary.

3Btb—54 to 60 inches; brown (7.5YR 4/4) clay loam; common medium distinct brown (7.5YR 5/4) mottles; weak medium subangular blocky structure; friable; few very fine roots; few distinct reddish brown (5YR 4/4) clay films and common distinct white (10YR 8/1 dry) silt coatings on faces of peds; few fine concretions (iron and manganese oxides); about 27 percent sand; common fine pebbles; strongly acid.

The solum ranges from 40 to more than 60 inches in thickness. Reaction ranges from neutral to very strongly acid throughout the profile.

The Bt horizon has hue of 10YR or 7.5YR and value of 4 or 5. The 2Bt horizon commonly has a higher content of fine sand than the overlying Bt horizon. The 3Btb horizon is a paleosol. In some pedons it is not within a depth of 60 inches.

Schuline Series

The Schuline series consists of well drained, slowly permeable soils in areas that formerly were surface mined. These soils have been reconstructed from surface-mined overburden. The soil material consists of a mixture of the premined soil, glacial till, and scattered small fragments of limestone, sandstone, shale, and coal. In most places the topsoil material has been replaced. Slopes range from 1 to 15 percent.

Schuline soils are similar to the Lenzburg and Swanwick soils and are commonly adjacent to Lenzburg, Morristown, and Swanwick soils. Lenzburg and Morristown soils have more rock fragments throughout than the Schuline soils. Their surface soil material has not been replaced. Lenzburg soils are in landscape positions similar to those of the Schuline soils or are in the more sloping areas. Morristown soils are in the more sloping areas. Swanwick soils have fewer rock fragments throughout than the Schuline soils and are more acid. They are in landscape positions similar to those of the Schuline soils.

Typical pedon of Schuline silt loam, 1 to 5 percent slopes, 1,600 feet north and 500 feet east of the center of sec. 22, T. 5 S., R. 2 W.

Ap—0 to 6 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/6) silt loam, very pale brown (10YR 7/3) dry; moderate fine and medium granular structure; friable; common very fine roots; about 9 percent sand; medium acid; abrupt smooth boundary.

A—6 to 10 inches; mixed brown (10YR 5/3), yellowish brown (10YR 5/6), and gray (10YR 5/1) silt loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; firm; few very fine and fine roots; about 9 percent sand; slightly acid; abrupt smooth boundary.

2C1—10 to 21 inches; mixed light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6) loam; massive; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; few dark concretions (iron and manganese oxides); about 30 percent sand; about 5 percent gravel; slight effervescence; mildly alkaline; clear smooth boundary.

2C2—21 to 36 inches; mixed yellowish brown (10YR 5/4), brownish yellow (10YR 6/6), gray (10YR 5/1), and light brownish gray (10YR 6/2) loam; massive; firm; few dark concretions (iron and manganese oxides); about 30 percent sand; about 5 percent gravel; slight effervescence; mildly alkaline; gradual smooth boundary.

2C3—36 to 54 inches; mixed yellowish brown (10YR 5/4), grayish brown (10YR 5/2), and brownish yellow (10YR 6/8) loam; massive; firm; few weathered shale fragments in the lower part; about 30 percent sand; about 7 percent gravel; strong effervescence; mildly alkaline; clear smooth boundary.

2C4—54 to 60 inches; mixed yellowish brown (10YR 5/4 and 5/6), gray (10YR 5/1), and dark grayish brown (10YR 4/2) loam; massive; friable; few dark concretions (iron and manganese oxides); about 40 percent sand; about 15 percent gravel; violent effervescence; mildly alkaline.

The replaced surface soil ranges from 2 to about 10 inches in thickness. The depth to bedrock is more than 5 feet. The content of coarse fragments less than 10 inches in size is commonly about 7 percent but ranges to 15 percent. The content of sand is more than 15 percent.

The Ap or A horizon is silt loam, silty clay loam, or clay loam. It has value of 3 to 5 and chroma of 2 to 6. The C horizon is silt loam, loam, silty clay loam, or clay loam. It has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 8.

Stoy Series

The Stoy series consists of somewhat poorly drained, slowly permeable soils on broad ridges, on knolls, and on side slopes along drainageways in the uplands. These soils formed in loess. Slopes range from 0 to 6 percent.

Stoy soils are similar to Bluford soils and are commonly adjacent to Blair, Hosmer, and Weir soils. Bluford soils have more clay in the subsoil than the Stoy soils. Blair soils have more sand in the lower part of the subsoil than the Stoy soils. They are mainly on the side slopes near the upper end of drainageways. The moderately well drained Hosmer soils are higher on the landscape than the Stoy soils. The poorly drained Weir soils are on broad upland flats and in depressions below the Stoy soils.

Typical pedon of Stoy silt loam, 2 to 4 percent slopes, 680 feet south and 670 feet west of the center of sec. 6, T. 5 S., R. 3 W.

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common fine roots; common fine concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

E1—5 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak very thick platy structure parting to weak medium granular; friable; few very fine roots; common distinct brown (10YR 4/3) coatings on faces of peds; common fine concretions (iron and manganese oxides); medium acid; clear smooth boundary.

E2—9 to 12 inches; yellowish brown (10YR 5/4) silt loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate thick platy structure parting to moderate medium granular; friable; few very fine roots; common fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

BE—12 to 15 inches; yellowish brown (10YR 5/4) silt loam; common fine yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few fine roots; common fine pale brown (10YR 6/3) coatings on faces of peds; few fine

concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt1—15 to 21 inches; yellowish brown (10YR 5/4) silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; strong fine and medium subangular blocky structure; firm; few very fine roots; common distinct grayish brown (10YR 5/2) clay films and many prominent light brownish gray (10YR 6/2) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt2—21 to 30 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common prominent grayish brown (10YR 5/2) clay films and few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; common fine concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Bt3—30 to 36 inches; brown (10YR 5/3) silty clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few distinct grayish brown (10YR 5/2) clay films and common distinct pale brown (10YR 6/3) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Bt4—36 to 44 inches; grayish brown (10YR 5/2) silty clay loam; few medium prominent strong brown (7.5YR 4/6) and common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few very fine roots; few distinct gray (10YR 5/1) clay films and common distinct pale brown (10YR 6/3) silt coatings on faces of peds; common fine concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Bx1—44 to 53 inches; light brownish gray (10YR 6/2) silty clay loam; common medium and coarse prominent brown and dark brown (7.5YR 4/4 and 3/4) mottles; weak coarse prismatic structure; firm; slightly brittle; few distinct pale brown (10YR 6/3) silt coatings on faces of peds; common fine concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bx2—53 to 60 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; firm; slightly brittle; common fine concretions (iron and manganese oxides); strongly acid.

The solum ranges from 40 to more than 60 inches in thickness. The A or Ap horizon has value of 3 to 5. Pedons in eroded areas commonly do not have an E horizon. The Bt horizon has value of 5 or 6 and chroma of 2 to 4. It is very strongly acid to medium acid. It is dominantly silty clay loam, but subhorizons in the upper or lower part are silt loam in some pedons. The content of clay averages less than 35 percent in the control section. The Bx or 2Bx horizon has value of 5 or 6 and chroma of 2 to 4 and is mottled. It is silty clay loam or silt loam.

Swanwick Series

The Swanwick series consists of moderately well drained, very slowly permeable soils in areas that formerly were surface mined. These soils have been reconstructed from surface-mined overburden. The soil material consists of a mixture of subsoil material from premined soils and glacial till and scattered fragments of limestone, sandstone, shale, and coal. Typically, the C horizon has one or more compacted layers, or traffic pans, that formed when the material was replaced and graded. Most areas have more than 10 inches of replaced topsoil material. Slopes range from 1 to 5 percent.

Swanwick soils are similar to Schuline soils and are commonly adjacent to Lenzburg, Morristown, and Schuline soils. Schuline soils have more sand than the Swanwick soils and are calcareous. They are in landscape positions similar to those of the Swanwick soils. Lenzberg and Morristown soils are in the more rolling, less recently mined areas. They have a higher content of coarse fragments throughout than the Swanwick soils.

Typical pedon of Swanwick silt loam, 1 to 5 percent slopes, about 600 feet south and 200 feet west of the center of sec. 28, T. 6 S., R. 4 W.

Ap—0 to 10 inches; mixed brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) dry; few medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium granular structure; friable; common very fine and fine roots; less than 1 percent coarse fragments; mildly alkaline; clear smooth boundary.

C1—10 to 18 inches; mixed brown (10YR 4/3) and yellowish brown (10YR 5/6) silt loam; few fine faint yellowish brown mottles; weak fine angular blocky structure in the upper 4 inches and weak medium angular blocky structure in the lower 4 inches; friable; few very fine and fine roots; less than 1 percent coarse fragments; mildly alkaline; abrupt smooth boundary.

C2—18 to 32 inches; mixed light gray (10YR 6/1) and light brownish gray (10YR 6/2) silty clay loam; common fine prominent yellowish red (5YR 4/6) mottles; massive; firm; few very fine roots; few fine concretions (iron and manganese oxides); less than 1 percent coarse fragments; very strongly acid; clear smooth boundary.

C3—32 to 40 inches; mixed brown (10YR 5/3) and light brownish gray (10YR 6/2) silt loam; common fine and medium distinct strong brown (7.5YR 5/8) mottles; massive; firm; few fine concretions (iron and manganese oxides); about 1 percent coarse fragments; slightly acid; abrupt smooth boundary.

C4—40 to 46 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; firm; few distinct white (10YR 8/1 dry) patches of silt; few fine and medium concretions (iron and manganese oxides); less than 1 percent coarse fragments; medium acid; abrupt smooth boundary.

C5—46 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; very firm; few distinct white (10YR 8/1 dry) patches of silt; few fine concretions (iron and manganese oxides); few fine pebbles; less than 1 percent coarse fragments; very strongly acid.

The depth to bedrock is more than 60 inches. The content of coarse fragments less than 10 inches in size commonly is less than 1 percent but ranges to about 5 percent. The content of sand is less than 15 percent. The replaced topsoil material ranges from 3 to 15 inches in thickness.

The A or Ap horizon has value of 4 or 5 and chroma of 2 to 4. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 8. It is typically silty clay loam or silt loam, but subhorizons of clay loam or loam are in the lower part of some pedons.

Tamalco Series

The Tamalco series consists of moderately well drained, very slowly permeable soils on mounds, knolls, and ridges in the uplands. These soils have a natric horizon. They formed in loess. Slopes range from 1 to 5 percent.

Tamalco soils are similar to Darmstadt soils and are commonly adjacent to Darmstadt, Hoyleton, and Oconee soils. The somewhat poorly drained Darmstadt soils are lower on the landscape than the Tamalco soils. Hoyleton and Oconee soils do not have a natric horizon and have a surface layer that is darker than that of the Tamalco soils. They are on the broader ridges and on the lower parts of the landscape.

Typical pedon of Tamalco silt loam, 1 to 5 percent slopes, eroded, 527 feet east and 434 feet north of the center of sec. 4, T. 6 S., R. 4 W.

Ap—0 to 6 inches; brown (10YR 4/3) and yellowish red (5YR 4/6) silt loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; few very fine and fine roots; few fine and medium dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt1—6 to 11 inches; strong brown (7.5YR 4/6) and yellowish red (5YR 4/6) silty clay; moderate very fine and fine prismatic structure; firm; few very fine and fine roots; few distinct dark reddish brown (5YR 3/4) clay films and few distinct pale brown (10YR 6/3) silt coatings on faces of peds; few fine and medium dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Bt2—11 to 15 inches; brown (7.5YR 4/4) silty clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate very fine and fine prismatic structure; firm; few very fine and fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Btn1—15 to 25 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; few very fine roots; few distinct brown (10YR 4/3) clay films and common prominent white (10YR 8/1 dry) streaks of silt on faces of peds; common fine and medium dark soft accumulations (iron and manganese oxides); strong effervescence; mildly alkaline; clear smooth boundary.

Btn2—25 to 34 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/4) and common medium faint light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; few distinct brown (10YR 4/3) clay films on faces of peds; common fine dark concretions and many medium soft accumulations (iron and manganese oxides); strong effervescence; moderately alkaline; gradual smooth boundary.

BCn—34 to 46 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 4/6) silt loam; weak coarse prismatic structure; friable; common fine and medium dark concretions and soft accumulations (iron and manganese oxides); strong effervescence; moderately alkaline; gradual smooth boundary.

2C—46 to 60 inches; dark brown (7.5YR 4/4) silt loam; common medium distinct brown (7.5YR 5/2) and few fine faint strong brown (7.5YR 4/6) mottles; massive; friable; few fine and medium dark soft accumulations (iron and manganese oxides); strong effervescence; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness. The loess ranges from about 40 to more than 60 inches in thickness.

The Ap horizon has hue of 10YR, 7.5YR, or 5YR and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay

or silty clay loam. It is very strongly acid to neutral. The Btn horizon has value of 5 or 6 and chroma of 2 to 6. It is silty clay loam or silt loam. It is mildly alkaline to strongly alkaline. The 2C horizon also is mildly alkaline to strongly alkaline. It has hue or 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

Wagner Series

The Wagner series consists of poorly drained, very slowly permeable soils on stream terraces. These soils formed in a thin mantle of loess and in the underlying dominantly clayey lacustrine sediments. Slopes range from 0 to 2 percent.

Wagner soils are similar to Cisne and Okaw soils and are commonly adjacent to Hurst and Okaw soils. Cisne soils formed in loess on uplands. The poorly drained Okaw and somewhat poorly drained Hurst soils are in positions on the stream terraces similar to those of the Wagner soils or are in the slightly higher positions. They have a surface layer that is lighter colored than that of the Wagner soils.

Typical pedon of Wagner silt loam, 1,200 feet north and 860 feet east of the southwest corner of sec. 24, T. 6 S., R. 3 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; few fine faint yellowish brown (10YR 5/8) mottles; weak fine and medium granular structure; friable; few very fine and fine roots; common fine concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

A—6 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; few fine faint yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to weak fine and medium granular; friable; few very fine roots; few fine concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

E1—9 to 13 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to weak fine subangular blocky; friable; few very fine roots; few fine concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

E2—13 to 18 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure parting to weak fine subangular blocky; friable; few very fine roots; common distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

Btg1—18 to 22 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent strong brown (7.5YR 5/8) mottles; moderate fine subangular blocky structure; very firm; few very fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Btg2—22 to 33 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/8) and common medium distinct olive yellow (2.5Y 6/6) mottles; weak medium prismatic structure parting to weak fine and medium subangular blocky; very firm; few very fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; common fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Btg3—33 to 40 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent strong brown (7.5YR 5/8) and common medium distinct light yellowish brown (2.5Y 6/4) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very firm; few very fine roots; common distinct very dark grayish brown (2.5Y 3/2) clay films on faces of peds; common fine and medium concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Btg4—40 to 47 inches; grayish brown (2.5Y 5/2) silty clay; common fine and medium prominent yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; very firm; few very fine roots; few distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; common fine and medium concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg5—47 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; very firm; few distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; common distinct white (10YR 8/1 dry) silt coatings on faces of peds in the upper 4 inches; common medium concretions (iron and manganese oxides); neutral.

The solum ranges from 40 to more than 60 inches in thickness. The Ap horizon has chroma of 1 or 2. The Btg horizon is silty clay or silty clay loam. It is neutral to very strongly acid.

Weir Series

The Weir series consists of poorly drained, very slowly permeable soils on broad upland flats. These soils formed in loess. Slopes range from 0 to 2 percent.

Weir soils are similar to Wynoose soils and are commonly adjacent to Hosmer and Stoy soils. Wynoose

soils formed in 40 to 55 inches of loess and in the underlying silty sediments. The moderately well drained Hosmer and somewhat poorly drained Stoy soils are slightly higher on the landscape than the Weir soils. They have a Bx horizon.

Typical pedon of Weir silt loam, 2,240 feet north and 1,160 feet east of the center of sec. 18, T. 5 S., R. 4 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry; common medium faint brown (10YR 5/3) and yellowish brown (10YR 5/4) mottles; weak fine and medium granular structure; common very fine roots; common fine and medium dark concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

Eg1—5 to 10 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct dark yellowish brown (10YR 4/6) and brownish yellow (10YR 6/8) mottles; weak thick platy structure parting to weak fine and medium subangular blocky; few very fine roots; common fine dark concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

Eg2—10 to 14 inches; light brownish gray (2.5Y 6/2) silt loam; common fine prominent yellowish brown (10YR 5/8) mottles; moderate fine and medium subangular blocky structure; few very fine roots; many distinct white (10YR 8/1 dry) silt coatings; common fine dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg1—14 to 24 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine prominent dark yellowish brown (10YR 4/6) and common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many distinct dark grayish brown (2.5Y 4/2) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg2—24 to 32 inches; light brownish gray (2.5Y 6/2) silty clay loam; few fine prominent dark yellowish brown (10YR 4/6) and common medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct grayish brown (2.5Y 5/2) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium dark concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Btg3—32 to 42 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium prominent yellowish brown mottles (10YR 5/6); weak medium prismatic structure parting to weak medium and coarse subangular blocky; firm; common fine and medium dark concretions (iron and manganese oxides); few distinct grayish brown (2.5Y 5/2) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; very strongly acid; gradual smooth boundary.

BCg—42 to 47 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium and coarse prominent yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; few distinct white (10YR 8/1 dry) silt coatings; common fine and medium dark concretions and common coarse dark accumulations (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Cg—47 to 60 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), and dark yellowish brown (10YR 4/6) mottles; massive; friable; common fine dark concretions and common very coarse dark accumulations (iron and manganese oxides); strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A or Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Eg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y and value of 5 or 6. It is strongly acid or very strongly acid.

Wellston Series

The Wellston series consists of well drained, moderately permeable soils on uplands. These soils formed in silty and loamy material over shale and sandstone bedrock. Slopes range from 18 to 60 percent.

The Wellston soils in this survey area have a slightly higher reaction in the lower part of the solum than is definitive for the series, have an argillic horizon with a slightly higher content of sand and with mottles of high chroma, and are slightly steeper. These differences, however, do not significantly affect the usefulness or behavior of the soils.

Wellston soils are similar to Hickory soils and are commonly adjacent to Ava, Belknap, Bonnie, Hickory, and Hosmer soils. Hickory soils formed mainly in glacial till and are upslope from the Wellston soils. Ava and Hosmer soils are on ridges and side slopes. They are deeper to bedrock than the Wellston soils. Belknap and Bonnie soils are on bottom land and are subject to flooding.

Typical pedon of Wellston silt loam, in an area of Hickory-Wellston silt loams, 18 to 30 percent slopes, 1,900 feet north and 1,500 feet west of the center of sec. 11, T. 4 S., R. 1 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine

granular structure; friable; common very fine and fine roots; few fine concretions (iron and manganese oxides); few medium pebbles; slightly acid; clear smooth boundary.

Bt1—4 to 9 inches; yellowish brown (10YR 5/4 and 5/6) silt loam; few medium distinct yellow (10YR 7/8) mottles; moderate fine subangular blocky structure; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine and medium accumulations (iron and manganese oxides); common fine, medium, and coarse pebbles; very strongly acid; clear smooth boundary.

Bt2—9 to 16 inches; yellowish brown (10YR 5/6) clay loam; common fine faint yellowish brown (10YR 5/4) and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure parting to moderate fine angular blocky; firm; few fine and medium and common very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine accumulations (iron and manganese oxides); common medium pebbles; very strongly acid; gradual smooth boundary.

Bt3—16 to 25 inches; yellowish brown (10YR 5/4 and 5/6) clay loam; few medium faint pale brown (10YR 6/3) and few fine distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular and angular blocky structure; firm; few very fine, fine, and medium roots; many distinct brown (7.5YR 5/4) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common medium accumulations (iron and manganese oxides); common fine and few medium and coarse pebbles; very strongly acid; gradual smooth boundary.

Bt4—25 to 33 inches; yellowish brown (10YR 5/4) loam; few fine prominent light brownish gray (2.5Y 6/2) and common medium faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; common distinct brown (7.5YR 5/4) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium accumulations and stains (iron and manganese oxides); common fine and medium pebbles and common medium shale fragments; strongly acid; gradual smooth boundary.

Bt5—33 to 39 inches; yellowish brown (10YR 5/4) loam; common medium distinct light yellowish brown (2.5Y 6/4), few fine distinct light brownish gray (2.5Y 6/2), and few fine faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; few very fine roots; many distinct brown (10YR 4/3) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine and medium stains and accumulations (iron and manganese oxides); few medium and coarse chert and weathered shale pebbles; medium acid; clear smooth boundary.

BC—39 to 46 inches; pale olive (5Y 6/4) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6) mottles; weak thick platy structure; firm; few distinct light brownish gray (10YR 6/2) clay films and few distinct white (10YR 8/1 dry) coatings on faces of peds; few fine stains (iron and manganese oxides) on interstices of platy shale fragments; few medium and coarse shale and sandstone fragments; neutral; clear smooth boundary.

2Cr—46 to 60 inches; light olive brown (2.5Y 5/4) and light olive gray (5Y 6/2) shale that crushes to silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak thick platy rock structure; very firm; common distinct dark yellowish brown (10YR 4/4) clay films on interstices of platy shale fragments; common fine accumulations (iron and manganese oxides); few fine and medium shale and sandstone fragments; slightly acid.

The solum ranges from 36 to 50 inches in thickness. The depth to weathered shale or sandstone bedrock ranges from 37 to more than 60 inches. The depth to hard bedrock is generally more than 72 inches.

The A horizon is silt loam in uneroded areas and silty clay loam in eroded areas. It has value of 2 to 6 and chroma 1 to 4. Some pedons have an E horizon. This horizon is silt loam. It has value and chroma of 4 to 6. The Bt horizon is silty clay loam, clay loam, silt loam, or loam. The upper part of this horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The lower part has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 8.

Wynoose Series

The Wynoose series consists of poorly drained, very slowly permeable soils on broad upland flats. These soils formed in loess and in the underlying silty sediments. Slopes range from 0 to 2 percent.

Wynoose soils are similar to Cisne and Weir soils and are commonly adjacent to Ava, Bluford, and Cisne soils. The moderately well drained Ava soils are higher on the landscape than the Wynoose soils. They have a Bx horizon. The somewhat poorly drained Bluford soils are slightly higher on the landscape than the Wynoose soils. They are not characterized by an abrupt textural change. Cisne soils have a surface layer that is slightly darker than that of the Wynoose soils. Also, they are generally farther from drainageways. Weir soils formed entirely in loess and are not characterized by an abrupt textural change.

Typical pedon of Wynoose silt loam, 105 feet north and 6 feet west of the center of sec. 16, T. 4 S., R. 2 W.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry; few fine distinct yellowish brown (10YR 5/8) mottles; weak thick platy structure parting to weak very fine granular; friable; few very fine roots; few distinct light gray (10YR 7/2 dry) silt coatings; few medium black (10YR 2/1) concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Eg1—7 to 11 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) silt loam; few fine distinct strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/6) mottles; weak thick platy structure parting to weak fine granular; friable; few very fine roots; few medium black (10YR 2/1) concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

Eg2—11 to 16 inches; light gray (10YR 7/2) silt loam; few fine distinct yellowish brown (10YR 5/8) and few fine prominent yellowish red (5YR 5/8) mottles; weak very thick platy structure parting to weak fine subangular blocky; friable; few very fine roots; common fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Bg/Eg—16 to 19 inches; light brownish gray (10YR 6/2) silty clay (Bg); few medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; white (10YR 8/1 dry) silt (Eg); massive; friable; few very fine roots; few fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; abrupt irregular boundary.

Btg1—19 to 25 inches; light brownish gray (2.5Y 6/2) silty clay; few fine faint yellowish brown (10YR 5/8) and few fine prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; few very fine roots; few distinct grayish brown (10YR 5/2) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; very strongly acid; gradual smooth boundary.

Btg2—25 to 34 inches; light brownish gray (2.5Y 6/2) silty clay; few medium prominent yellowish red (5YR 5/8) and few fine distinct yellowish brown (10YR 5/8) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btg3—34 to 42 inches; light brownish gray (10YR 6/2) silty clay loam; common fine and medium prominent yellowish red (5YR 5/6 and 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few distinct brown and dark brown (10YR 4/3) clay films on faces of peds; common medium black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

Btg4—42 to 50 inches; light brownish gray (10YR 6/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine black (10YR 2/1) concretions (iron and manganese oxides); very strongly acid; gradual smooth boundary.

2BCg—50 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; few fine accumulations (iron and manganese oxides) in root channels; few distinct white (10YR 8/1 dry) silt coatings on faces of peds; very strongly acid.

The solum ranges from 40 to more than 60 inches in thickness. The loess ranges from about 40 to 55 inches in thickness. The clay content ranges from 35 to 42 percent in the control section. The Eg horizon has value of 5 to 8. The Btg horizon has hue of 10YR or 2.5Y and value of 5 or 6.

Formation of the Soils

Sam J. Indorante, soil scientist, Soil Conservation Service, helped prepare this section.

Soil-forming processes act on deposited or accumulated geological material. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent material; (2) the plant and animal life on and in the material that develops into a soil; (3) the topography; (4) the climate under which the soil material has accumulated and existed since accumulation; and (5) the length of time that the processes of soil formation have acted on the soil material (*12*).

The factors of soil formation are so closely interrelated that few generalizations can be made regarding the effects of any one factor unless the effects of the other four factors are known. Each factor is modified by the other soil-forming factors.

Climate and plant and animal life are active factors of soil formation. They act on the parent material and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. Time is needed for the differentiation of soil horizons. Usually, a long time is needed for the development of distinct horizons.

Parent Material

Parent material is the geologic or earth material in which a soil forms. It determines the mineral and chemical composition of the soil and to a large extent the rate of the soil-forming processes. The soils of Perry County formed in loess and silty material, glacial till, alluvium, lacustrine sediments, material that weathered from bedrock, and a regolith of cast overburden in areas affected by surface mining and reclamation.

Loess, or wind-deposited material, is the most extensive parent material in the county. It blankets many of the other materials. The uplands in the county generally are blanketed with 4 to 6 feet of loess. The loess was deposited during two periods (*7*). Peoria Loess was deposited during the Woodfordian Substage of the Wisconsinan Stage, about 22,000 to 12,500 years ago. Underlying the Peoria Loess is Roxana Silt, which was deposited more than 28,000 years ago, during the Altonian Substage. A weakly developed Farmdale Soil formed in Roxana Silt during the Farmdalian Substage, 28,000 to 22,000 years ago.

The loess in the western part of the county is dominantly Peorian in age. It is generally more than 60 inches thick on the ridgetops. Hosmer, Stoy, Weir, and Oconee are examples of soils in these areas. Peoria Loess makes up about one-half to three-quarters of the loess in the eastern part of the county. Roxana Silt has had a greater influence on the modern soils in this part of the county than on those in the western part. Ava and Bluford are examples of soils that formed in Peoria Loess and in the underlying Roxana Silt.

Glacial till is material laid down directly by glaciers with a limited amount of water action. In Perry County the till was deposited mainly during the Illinoian glacial period. Older tills are in some areas. The glacial till ranges from about 15 to 30 feet in thickness. It is a mixture of different size particles. It is generally acid in the upper part and calcareous in the lower part. It is firm throughout. The texture is loam, clay loam, or silty clay loam. In many areas the Sangamon Soil, a paleosol, is in the surface layer of the Illinoin till. Soils that formed in glacial till are on side slopes along drainageways. Hickory and Atlas are examples of soils that formed mainly in this material.

The soils on flood plains formed in alluvium, or water-laid material that is Wisconsinan in age or younger. Many areas are still receiving sediment. The alluvium ranges from silt loam to silty clay. Karnak soils formed dominantly in clayey alluvium in slack-water areas on broad flats and in sloughs. Belknap and Bonnie soils formed in silty alluvium.

In the southern part of the county, lacustrine sediments were deposited on terraces along the Little Muddy River, Beaucoup Creek, and Galum Creek during the latter part of the Wisconsinan Glaciation. The Big Muddy River was blocked and the resulting slack-water lake backed up water into parts of the flood plains along the Little Muddy River and along Beaucoup and Galum Creeks (*15*). The lucustrine sediments are generally clayey and are blanketed with as much as 2 feet of loess. Okaw, Hurst, and Colp soils formed in loess and the underlying lacustrine sediments.

On a small acreage in the county, the soils formed at least partly in material that weathered from sandstone, siltstone, shale, or limestone (fig. 11). These soils are on the lower part of strongly sloping to steep slopes. In these areas, soft bedrock is at a depth of about 40

inches and hard bedrock is generally below a depth of 72 inches. Wellston soils are common in these areas.

Surface mining for coal has affected about 17 percent of the acreage in Perry County. The soils in these areas formed in the material that results from the excavation and placement or replacement of overburden during mining activities. The characteristics of these soils depend mainly on the character of the premined overburden, the method of mining, and the method of reclamation (*11*). In a typical area of undisturbed overburden, the modern soils formed in 4 to 6 feet of loess, which is underlain by 15 to 30 feet of loamy

Figure 11.—An area of bedded shale underlying a thin mantle of loess and glacial till.

glacial till. The till is underlain by 5 to 7 feet of bedrock. Spoil banks, or cast overburden material, consist mainly of a mixture of glacial till and bedrock. Lenzburg and Morristown soils are on these spoil banks.

In some areas the overburden is removed and segregated. Two methods are used to segregate the soil material. When the first of these methods is applied, the upper loamy overburden is removed, mainly by a wheel, and placed on the cast overburden. It is then graded. The surface generally is covered with material from the surface layer of the premined soils. The loamy, calcareous Schuline soils are an example of the reconstructed soils in these areas.

When the second method is applied, the soil material directly in front of the open pit is removed. First the surface soil is removed and stored. Then the subsoil and the upper part of the substratum are removed, commonly by a pan-scrapper. The soil material is then transported to the area behind the open pit. At the same time, the cast overburden behind the pit is graded. Next, subsoil and substratum material is replaced over the graded cast overburden. Finally, the surface soil material of the premined soil is replaced. The silty, nonacid Swanwick soils are an example of soils that have been reclaimed by this process.

Plant and Animal Life

Living organisms, such as vegetation, animals, bacteria, and fungi, have important effects on soil formation. Human activities, such as farming and surface mining, also affect soil formation. Vegetation largely determines the organic matter content, color, and fertility of the surface layer. Most of the soils in Perry County formed under forest vegetation and have a light colored surface layer. Examples are Stoy and Bluford soils. Some soils formed under grass vegetation and have a moderately dark surface layer. These soils have more organic matter than those that formed under trees. Cisne and Hoyleton soils are examples.

Burrowing animals and plant roots help to keep the soil open and porous. Bacteria and fungi help to decompose plant and animal remains.

Topography

Many differences among the soils in the county result from variations in topography. Slope affects drainage, runoff, erosion, and deposition. Slopes differ in gradient, length, shape, and exposure. These slope characteristics are responsible for differences among soils that formed in the same kind of parent material, such as Ava, Bluford, and Wynoose soils. Soils that formed in different kinds of parent material but that are in areas of similar topography have similar characteristics. Examples are Stoy and Hurst soils.

As the slope gradient increases, the runoff rate and the erosion hazard also increase. Erosion can change the characteristics of soils, as is indicated by comparing severely eroded Ava soils with uneroded Ava soils.

In areas of Wynoose and other nearly level soils, water has been able to move through the parent material. As a result, the subsoil has become finer textured and the soils are more extensively leached of soluble material.

Climate

Climate affects plant and animal life, weathering, and erosion. The humid, continental climate in Perry County has favored the rapid breakdown and weathering of soil material, the formation of clay, and the downward movement of these materials in the profile. Most upland soils in the county have more clay in the subsoil than in the surface layer. More detailed information about the climate is available under the heading "General Nature of the County."

Time

Soils generally become more strongly developed as time passes. Soils that show little or no evidence of profile development are considered immature. Soils having well expressed horizons are considered mature. The soils in surface-mined areas, such as Morristown and Schuline soils, are immature because the active factors of soil formation have had little time, less than 50 years, to differentiate soil horizons. Belknap soils on bottom land are examples of somewhat immature soils. They still accumulate deposits during periods of flooding and have weakly developed horizons. Bluford and Wynoose soils are examples of mature soils that have well expressed horizons.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vols., illus.

(2) American Society for Testing and Materials. 1985. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Austin, David. Early settlers of Lost Prairie, Pinckneyville, and Tamaroa Townships, Perry County, Illinois. 7 pp. (Unpublished data compiled in 1979)

(4) Austin, David. The Halliday Salt Works of St. Johns, Illinois. 9 pp. (Unpublished data compiled in 1979)

(5) Buck, Jeffery L. An analysis of forest acreage change by alternative land use and soil capability class for Perry County, Illinois 1965-1980. M.S. thesis, South. Ill. Univ., Carbondale, Ill., approved in 1982, 48 pp., illus.

(6) Essex, B.L., and D.A. Ganser. 1965. Illinois' timber resource. U.S. Dep. Agric., Forest Serv. Bull. LS-3, 56 pp., illus.

(7) Fehrenbacher, J.B. 1973. Loess stratigraphy, distribution, and time of deposition in Illinois. Soil Sci. 115: 176-182, illus.

(8) Fehrenbacher, J.B., and others. 1978. Soil productivity in Illinois. Univ. of Ill., Coll. of Agric., Coop. Ext. Serv. Circ. 1156, 21 pp., illus.

(9) Illinois Coal Association. 1982. Coal facts. 58 pp., illus.

(10) Illinois Cooperative Crop Reporting Service. 1980. Illinois agriculture statistics annual summary. Bull. 80-1, 103 pp., illus.

(11) Indorante, S.J., and I.J. Jansen. 1981. Soil variability on surface-mined and undisturbed land in southern Illinois. Soil Sci. Soc. Am. Proc. 45: 564-568, illus.

(12) Jenny, Hans. 1941. Factors of soil formation. McGraw-Hill Book Company, Inc., 281 pp., illus.

(13) Leighton, M.M., George E. Ekblaw, and Leland Horberg. 1948. Physiographic divisions of Illinois. Ill. State Geol. Surv. Rep. Invest. 129, 33 pp., illus.

(14) Perry County Soil and Water Conservation District. Long range program. 104 pp. (Unpublished data compiled in 1981)

(15) Shaw, E.W. 1915. Newly discovered beds of extinct lakes in southern and western Illinois and adjacent states. *In* F.W. DeWolf and others, Year book. Illinois Geol. Surv. Bull. 20, pp. 139-157.

(16) Treworgy, Colin G., Lawrence E. Bengal, and Amy G. Dingwell. 1978. Reserves and resources of surface-minable coal in Illinois. Ill. Geol. Surv. Circ. 504, 44 pp., illus.

(17) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. (Revision available as a directive in the Soil Conservation Service State Office at Champaign, Illinois)

(18) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(19) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cast overburden. The material removed in gaining access to coal; also called spoil bank or spoil pile.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard

compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and

wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Final cut. The last cut or line of excavation made on a specific property or area.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Highwall (mining). The unexcavated face of exposed overburden and coal in a surface mine or the face or bank on the uphill side of a contour strip-mine excavation.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Mollic epipedon. A thick, dark, humus-rich horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$ The degrees of sodicity are—

	SAR
Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-80 at Carbondale, Illinois)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	41.3	22.0	31.6	68	-7	10	2.67	1.49	3.71	6	4.7
February---	46.3	25.4	35.8	71	-3	13	2.94	1.38	4.55	6	3.1
March------	55.7	34.4	45.0	79	10	70	4.44	2.46	6.56	8	2.6
April------	69.2	45.5	57.3	87	25	254	4.13	2.43	5.21	8	.3
May--------	78.2	53.6	65.9	93	33	487	4.28	2.38	5.27	7	.0
June-------	86.5	62.6	74.5	98	47	722	4.03	2.79	5.08	6	.0
July-------	89.7	66.4	78.1	99	50	859	3.89	2.34	5.35	6	.0
August-----	88.6	63.9	76.3	100	47	809	3.84	2.14	5.47	6	.0
September--	82.5	56.4	69.5	95	36	582	2.99	1.32	4.08	5	.0
October----	71.8	43.9	57.9	90	25	272	2.30	1.51	3.38	4	.0
November---	57.2	34.6	45.9	79	12	75	3.78	1.85	6.28	6	1.1
December---	45.3	27.1	36.2	69	3	14	3.20	1.52	4.44	6	1.8
Yearly:											
Average--	67.9	44.8	56.4	---	---	---	---	---	---	---	---
Total----	---	---	---	---	---	4,167	42.49	36.75	50.56	74	13.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-80 at Carbondale, Illinois)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 9	Apr. 16	May 4
2 years in 10 later than--	Mar. 30	Apr. 10	Apr. 26
5 years in 10 later than--	Mar. 23	Apr. 1	Apr. 14
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 21	Oct. 10	Oct. 3
2 years in 10 earlier than--	Nov. 1	Oct. 18	Oct. 5
5 years in 10 earlier than--	Nov. 6	Oct. 28	Oct. 15

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Carbondale, Illinois)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	208	191	159
8 years in 10	215	194	169
5 years in 10	232	208	180
2 years in 10	245	219	194
1 year in 10	250	222	203

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
2	Cisne silt loam	19,986	7.0
3A	Hoyleton silt loam, 0 to 2 percent slopes	8,613	3.0
3B	Hoyleton silt loam, 2 to 4 percent slopes	4,785	1.7
3B2	Hoyleton silt loam, 2 to 6 percent slopes, eroded	3,588	1.3
4B	Richview silt loam, 2 to 5 percent slopes	326	0.1
4C2	Richview silt loam, 5 to 10 percent slopes, eroded	287	0.1
5C3	Blair silty clay loam, 5 to 10 percent slopes, severely eroded	11,786	4.2
5D	Blair silt loam, 10 to 18 percent slopes	3,118	1.1
5D3	Blair silty clay loam, 10 to 18 percent slopes, severely eroded	8,073	2.8
7D3	Atlas silty clay loam, 10 to 18 percent slopes, severely eroded	354	0.1
8E	Hickory silt loam, 18 to 30 percent slopes	5,039	1.8
8E3	Hickory silty clay loam, 18 to 30 percent slopes, severely eroded	3,969	1.4
8G	Hickory silt loam, 30 to 60 percent slopes	1,664	0.6
12	Wynoose silt loam	5,878	2.1
13A	Bluford silt loam, 0 to 2 percent slopes	11,031	3.9
13B	Bluford silt loam, 2 to 4 percent slopes	8,155	2.9
13B2	Bluford silt loam, 2 to 6 percent slopes, eroded	4,822	1.7
14B	Ava silt loam, 2 to 5 percent slopes	6,601	2.3
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3,279	1.2
26	Wagner silt loam	341	0.1
84	Okaw silt loam	1,064	0.4
108	Bonnie silt loam	21,790	7.7
113	Oconee silt loam	2,295	0.8
122B2	Colp silt loam, 2 to 7 percent slopes, eroded	1,003	0.4
164A	Stoy silt loam, 0 to 2 percent slopes	7,571	2.7
164B	Stoy silt loam, 2 to 4 percent slopes	11,270	4.0
164B2	Stoy silt loam, 2 to 6 percent slopes, eroded	5,847	2.1
165	Weir silt loam	3,645	1.3
214B	Hosmer silt loam, 2 to 5 percent slopes	12,635	4.5
214C3	Hosmer silty clay loam, 5 to 10 percent slopes, severely eroded	6,061	2.1
338	Hurst silt loam	1,641	0.6
382	Belknap silt loam	17,955	6.3
426	Karnak silty clay	846	0.3
536	Dumps, mine	511	0.2
581B2	Tamalco silt loam, 1 to 5 percent slopes, eroded	659	0.2
787	Banlic silt loam	1,320	0.5
802B	Orthents, loamy, undulating	9,341	3.3
821G	Morristown cobbly silty clay loam, 20 to 60 percent slopes, very stony	7,200	2.5
823B	Schuline silt loam, 1 to 5 percent slopes	3,642	1.3
823C	Schuline silt loam, 5 to 10 percent slopes	617	0.2
823D	Schuline silt loam, 10 to 15 percent slopes	219	0.1
824B	Swanwick silt loam, 1 to 5 percent slopes	2,045	0.7
825C	Lenzburg silty clay loam, acid substratum, 2 to 12 percent slopes	308	0.1
850D3	Hickory-Hosmer silty clay loams, 10 to 18 percent slopes, severely eroded	5,093	1.8
866	Dumps, slurry	997	0.4
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3,761	1.3
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	3,376	1.2
871G	Lenzburg gravelly silty clay loam, 20 to 60 percent slopes, stony	11,161	3.9
900E	Hickory-Wellston silt loams, 18 to 30 percent slopes	1,291	0.5
900E3	Wellston-Hickory silty clay loams, 18 to 30 percent slopes, severely eroded	741	0.3
900G	Wellston-Hickory silt loams, 30 to 60 percent slopes	425	0.1
912A	Hoyleton-Darmstadt silt loams, 0 to 2 percent slopes	3,800	1.3
912B2	Darmstadt-Hoyleton silt loams, 2 to 6 percent slopes, eroded	6,466	2.3
916	Oconee-Darmstadt silt loams	2,359	0.8
929D3	Hickory-Ava silty clay loams, 10 to 18 percent slopes, severely eroded	4,641	1.6
991	Cisne-Huey silt loams	1,896	0.7
1108	Bonnie silt loam, wet	1,542	0.5
5002	Cisne silt loam, mine sinks	106	*
5912	Hoyleton-Darmstadt silt loams, mine sinks	140	*
	Water	4,545	1.6
	Total	283,520	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
2	Cisne silt loam (where drained)
3A	Hoyleton silt loam, 0 to 2 percent slopes
3B	Hoyleton silt loam, 2 to 4 percent slopes
3B2	Hoyleton silt loam, 2 to 6 percent slopes, eroded
4B	Richview silt loam, 2 to 5 percent slopes
13A	Bluford silt loam, 0 to 2 percent slopes (where drained)
13B	Bluford silt loam, 2 to 4 percent slopes (where drained)
13B2	Bluford silt loam, 2 to 6 percent slopes, eroded (where drained)
14B	Ava silt loam, 2 to 5 percent slopes
26	Wagner silt loam (where drained)
108	Bonnie silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
113	Oconee silt loam (where drained)
122B2	Colp silt loam, 2 to 7 percent slopes, eroded
164A	Stoy silt loam, 0 to 2 percent slopes
164B	Stoy silt loam, 2 to 4 percent slopes
164B2	Stoy silt loam, 2 to 6 percent slopes, eroded
214B	Hosmer silt loam, 2 to 5 percent slopes
382	Belknap silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
787	Banlic silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
823B	Schuline silt loam, 1 to 5 percent slopes
824B	Swanwick silt loam, 1 to 5 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
2----------------------- Cisne	IIIw	115	35	52	4.5	7.5
3A---------------------- Hoyleton	IIw	116	34	53	4.7	7.8
3B---------------------- Hoyleton	IIe	115	34	52	4.7	7.8
3B2--------------------- Hoyleton	IIe	111	33	51	4.5	7.5
4B---------------------- Richview	IIe	109	33	50	4.6	7.6
4C2--------------------- Richview	IIIe	103	31	47	4.3	7.1
5C3--------------------- Blair	IVe	82	29	38	3.2	5.7
5D---------------------- Blair	IVe	86	30	40	3.3	5.7
5D3--------------------- Blair	VIe	---	---	---	3.1	5.1
7D3--------------------- Atlas	VIe	---	---	---	1.7	2.8
8E---------------------- Hickory	VIe	---	---	---	2.4	4.0
8E3--------------------- Hickory	VIe	---	---	---	1.9	3.2
8G---------------------- Hickory	VIIe	---	---	---	---	---
12---------------------- Wynoose	IIIw	96	33	46	3.9	6.5
13A--------------------- Bluford	IIw	103	33	49	4.1	6.8
13B--------------------- Bluford	IIe	102	33	49	4.1	6.8
13B2-------------------- Bluford	IIe	99	32	47	3.9	6.6
14B--------------------- Ava	IIe	97	33	48	4.3	7.1
14C3-------------------- Ava	IVe	74	25	36	3.3	5.4

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
26----------------------- Wagner	IIIw	106	35	49	3.9	---
84----------------------- Okaw	IIIw	84	28	41	3.1	---
108---------------------- Bonnie	IIIw	113	37	---	4.0	---
113---------------------- Oconee	IIw	120	36	54	5.0	8.3
122B2-------------------- Colp	IIIe	81	30	40	3.6	5.9
164A--------------------- Stoy	IIw	112	35	52	4.5	7.5
164B--------------------- Stoy	IIe	111	35	51	4.5	7.5
164B2-------------------- Stoy	IIe	108	34	50	4.3	7.2
165---------------------- Weir	IIIw	103	34	45	3.9	6.7
214B--------------------- Hosmer	IIe	107	35	50	4.6	7.7
214C3-------------------- Hosmer	IVe	82	27	39	3.5	5.8
338---------------------- Hurst	IIIw	87	32	45	3.6	6.0
382---------------------- Belknap	IIw	124	39	---	4.6	7.6
426---------------------- Karnak	IVw	39	13	---	1.3	---
536**. Dumps						
581B2-------------------- Tamalco	IIIe	65	23	32	2.7	4.5
787---------------------- Banlic	IIw	115	37	46	4.2	7.0
802B**. Orthents						
821G--------------------- Morristown	VIIe	---	---	---	---	---
823B--------------------- Schuline	IIe	92	31	34	3.7	6.1

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
823C----------------------- Schuline	IIIe	91	31	33	3.6	6.0
823D----------------------- Schuline	IIIe	88	30	32	3.5	5.8
824B----------------------- Swanwick	IIIe	80	27	29	3.2	5.3
825C----------------------- Lenzburg	IIIe	68	18	21	2.8	4.5
850D3---------------------- Hickory-Hosmer	VIe	---	---	---	2.8	4.6
866**. Dumps						
871B, 871D----------------- Lenzburg	VIe	---	---	---	---	5.0
871G----------------------- Lenzburg	VIIe	---	---	---	---	---
900E----------------------- Hickory-Wellston	VIe	---	---	---	2.5	4.8
900E3---------------------- Wellston-Hickory	VIIe	---	---	---	---	4.5
900G----------------------- Wellston-Hickory	VIIe	---	---	---	---	---
912A----------------------- Hoyleton-Darmstadt	IIIw	98	31	46	3.6	6.7
912B2---------------------- Darmstadt-Hoyleton	IIIe	83	28	41	3.5	5.8
916------------------------ Oconee-Darmstadt	IIIw	100	32	47	4.3	7.0
929D3---------------------- Hickory-Ava	VIe	---	---	---	2.7	4.5
991------------------------ Cisne-Huey	IVw	95	30	44	3.7	---
1108----------------------- Bonnie	Vw	---	---	---	---	---
5002----------------------- Cisne	Vw	---	---	---	---	3.8
5912----------------------- Hoyleton-Darmstadt	Vw	---	---	---	---	3.7

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
5D, 5D3 Blair	4A	Slight	Slight	Slight	Slight	White oak	70	52	Shortleaf pine, loblolly pine, eastern white pine.
						Northern red oak	70	52	
						Green ash	---	---	
						Bur oak	70	52	
7D3 Atlas	4C	Slight	Slight	Moderate	Moderate	White oak	70	52	Green ash, pin oak, red maple, Austrian pine.
						Northern red oak	70	52	
						Bur oak	70	52	
						Green ash	---	---	
8E, 8E3 Hickory	5R	Moderate	Moderate	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	
8G Hickory	5R	Severe	Severe	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	
14C3 Ava	4A	Slight	Slight	Slight	Slight	White oak	75	57	Black walnut, eastern cottonwood, sweetgum, yellow-poplar, white oak, American sycamore.
						Northern red oak	80	62	
						Yellow-poplar	90	90	
						Black walnut	---	---	
821G Morristown	---	---------	---------	---------	---------		---	---	Eastern white pine, black locust, red pine, Scotch pine, Norway spruce, white spruce.
850D3**: Hickory	5A	Slight	Slight	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
850D3**:									
Hosmer	4A	Slight	Slight	Slight	Moderate	White oak	75	57	Eastern white pine, shortleaf pine, red pine, yellow-poplar, white ash.
						Yellow-poplar	90	90	
						Virginia pine	75	115	
						Sugar maple	75	47	
871D Lenzburg	5A	Slight	Slight	Slight	Slight	Sweetgum	76	70	Black walnut, green ash, white ash, eastern cottonwood.
						Black walnut	73	---	
						Eastern cottonwood	---	---	
871G Lenzburg	5R	Severe	Severe	Slight	Slight	Sweetgum	76	70	Black walnut, green ash, white ash, eastern cottonwood.
						Black walnut	73	---	
						Eastern cottonwood	---	---	
900E**:									
Hickory	5R	Moderate	Moderate	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	
Wellston	4R	Moderate	Moderate	Slight	Slight	Northern red oak	71	53	Eastern white pine, black walnut, yellow-poplar, white ash, white oak, northern red oak, red pine, green ash.
						Yellow-poplar	90	90	
						Virginia pine	70	109	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
900E3**:									
Wellston	4R	Moderate	Moderate	Slight	Slight	Northern red oak	71	53	Eastern white pine, black walnut, yellow-poplar, white ash, white oak, northern red oak, red pine, green ash.
						Yellow-poplar	90	90	
						Virginia pine	70	109	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
Hickory	5R	Moderate	Moderate	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
900G**:									
Wellston	4R	Severe	Severe	Slight	Slight	Northern red oak	71	53	Eastern white pine, black walnut, yellow-poplar, white ash, white oak, northern red oak, red pine, green ash.
						Yellow-poplar	90	90	
						Virginia pine	70	109	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
Hickory	5R	Severe	Severe	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	
929D3**:									
Hickory	5A	Slight	Slight	Slight	Slight	White oak	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	67	
						Black oak	---	---	
						Green ash	---	---	
						Bitternut hickory	---	---	
						Yellow-poplar	95	98	
Ava	4A	Slight	Slight	Slight	Slight	White oak	75	57	Black walnut, eastern cottonwood, sweetgum, yellow-poplar, white oak, American sycamore.
						Northern red oak	80	62	
						Yellow-poplar	90	90	
						Black walnut	---	---	
1108 Bonnie	5W	Slight	Severe	Severe	Severe	Pin oak	90	72	Eastern cottonwood, red maple, American sycamore, sweetgum, baldcypress, pin oak.
						Eastern cottonwood	100	128	
						Sweetgum	---	---	
						Cherrybark oak	---	---	
						American sycamore	---	---	
5002 Cisne	4W	Slight	Severe	Severe	Severe	Pin oak	70	52	Pin oak, green ash, water tupelo, swamp white oak, baldcypress.
						White oak	---	---	
						Eastern cottonwood	---	---	
						American sycamore	---	---	
5912**:									
Hoyleton	4W	Slight	Severe	Moderate	Moderate	White oak	70	52	Pin oak, white oak, eastern cottonwood, green ash, baldcypress.
						Northern red oak	70	52	
						Green ash	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
5912**:									
Darmstadt------	4T	Slight	Slight	Moderate	Slight	White oak-----------	70	52	Eastern white pine, white oak, green ash, eastern redcedar, osageorange.
						Black oak-----------	70	52	
						Pignut hickory------	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
2 Cisne	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
3A, 3B, 3B2 Hoyleton	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
4B, 4C2 Richview	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
5C3, 5D, 5D3 Blair	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
7D3 Atlas	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
8E, 8E3, 8G Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
12 Wynoose	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
13A, 13B, 13B2 Bluford	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
14B, 14C3---------Ava	Washington hawthorn, Amur privet, eastern redcedar, Tatarian honeysuckle, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
26---------------Wagner	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
84---------------Okaw	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
108--------------Bonnie	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, Washington hawthorn, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
113--------------Oconee	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
122B2------------Colp	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
164A, 164B, 164B2-Stoy	Washington hawthorn, Amur privet, eastern redcedar, Tatarian honeysuckle, Amur honeysuckle, arrowwood, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
165--------------Weir	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
214B, 214C3 Hosmer	Eastern redcedar, arrowwood, Washington hawthorn, Tatarian honeysuckle, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
338 Hurst	Washington hawthorn, Amur privet, arrowwood, Tatarian honeysuckle, Amur honeysuckle, eastern redcedar, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
382 Belknap	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.
426 Karnak	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
536*. Dumps				
581B2 Tamalco	Russian-olive, eastern redcedar.	Siberian elm, green ash.	---	---
787 Banlic	Amur privet, arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
802B*. Orthents				
821G. Morristown				
823B, 823C, 823D Schuline	Eastern redcedar, jack pine, Washington hawthorn, osageorange, Russian-olive.	Honeylocust, northern catalpa.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- 8-15	16-25	26-35	>35
824B: Swanwick	Eastern redcedar, American cranberrybush, Amur privet, Washington hawthorn, Amur honeysuckle, autumn-olive, Tatarian honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
825C: Lenzburg	Eastern redcedar, jack pine, Washington hawthorn, osageorange, Russian-olive.	Honeylocust, northern catalpa.	---	---
850D3*:				
Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Hosmer	Eastern redcedar, arrowwood, Washington hawthorn, Tatarian honeysuckle, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
866*. Dumps				
871B, 871D, 871G: Lenzburg	Eastern redcedar, jack pine, Washington hawthorn, osageorange, Russian-olive.	Honeylocust, northern catalpa.	---	---
900E*:				
Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Wellston	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
900E3*, 900G*: Wellston	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
900E3*, 900G*:				
Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
912A*:				
Hoyleton	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Darmstadt	Eastern redcedar, Russian-olive.	Siberian elm, green ash.	---	---
912B2*:				
Darmstadt	Eastern redcedar, Russian-olive.	Siberian elm, green ash.	---	---
Hoyleton	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
916*:				
Oconee	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Darmstadt	Eastern redcedar, Russian-olive.	Siberian elm, green ash.	---	---
929D3*:				
Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Ava	Washington hawthorn, Amur privet, eastern redcedar, Tatarian honeysuckle, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
991*:				
Cisne	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Huey	Eastern redcedar, Russian-olive.	Siberian elm, green ash.	---	---
1108 Bonnie	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, Washington hawthorn, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
5002 Cisne	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
5912*:				
Hoyleton	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Darmstadt	Eastern redcedar, Russian-olive.	Siberian elm, green ash.	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2: Cisne	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
3A, 3B, 3B2: Hoyleton	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
4B: Richview	Slight	Slight	Moderate: slope.	Slight	Slight.
4C2: Richview	Slight	Slight	Severe: slope.	Slight	Slight.
5C3: Blair	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness.
5D, 5D3: Blair	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
7D3: Atlas	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: wetness.	Severe: wetness.
8E, 8E3: Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
8G: Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
12: Wynoose	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
13A, 13B, 13B2: Bluford	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
14B: Ava	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
14C3: Ava	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight	Slight.
26: Wagner	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
84: Okaw	Severe: flooding, ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
108------------------- Bonnie	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
113------------------- Oconee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
122B2----------------- Colp	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Slight.
164A, 164B, 164B2----- Stoy	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
165------------------- Weir	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
214B------------------ Hosmer	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
214C3----------------- Hosmer	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Slight.
338------------------- Hurst	Severe: flooding, wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
382------------------- Belknap	Severe: flooding, wetness.	Moderate: flooding, wetness, percs slowly.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
426------------------- Karnak	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.
536*. Dumps					
581B2----------------- Tamalco	Severe: percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: percs slowly, excess sodium.	Slight----------	Severe: excess sodium.
787------------------- Banlic	Severe: flooding, wetness.	Moderate: flooding, wetness, percs slowly.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
802B*. Orthents					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
821G: Morristown	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, droughty, slope.
823B: Schuline	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
823C: Schuline	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
823D: Schuline	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
824B: Swanwick	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
825C: Lenzburg	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: erodes easily.	Moderate: large stones.
850D3*:					
Hickory	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Hosmer	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
866*. Dumps					
871B: Lenzburg	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: large stones, slope.	Slight	Moderate: large stones.
871D: Lenzburg	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: large stones, slope.
871G: Lenzburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
900E*:					
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
900E3*:					
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
900G*:					
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
912A*:					
Hoyleton	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Darmstadt	Severe: wetness, percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: excess sodium.
912B2*:					
Darmstadt	Severe: wetness, percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: excess sodium.
Hoyleton	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
916*:					
Oconee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Darmstadt	Severe: wetness, percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: excess sodium.
929D3*:					
Hickory	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Ava	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
991*:					
Cisne	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Huey	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.
1108 Bonnie	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
5002 Cisne	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
5912*:					
Hoyleton	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Darmstadt	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: excess sodium, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
2------------------ Cisne	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
3A----------------- Hoyleton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
3B, 3B2------------ Hoyleton	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
4B----------------- Richview	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4C2---------------- Richview	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
5C3, 5D, 5D3------- Blair	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7D3---------------- Atlas	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8E, 8E3------------ Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8G----------------- Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
12----------------- Wynoose	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
13A---------------- Bluford	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
13B, 13B2---------- Bluford	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
14B, 14C3---------- Ava	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
26----------------- Wagner	Good	Good	Fair	Fair	Fair	Good	Good	Good	Fair	Fair.
84----------------- Okaw	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
108---------------- Bonnie	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
113---------------- Oconee	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
122B2-------------- Colp	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
164A--------------- Stoy	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
164B, 164B2----Stoy	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
165----Weir	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
214B----Hosmer	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
214C3----Hosmer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
338----Hurst	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
382----Belknap	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
426----Karnak	Very poor.	Poor	Poor	Fair	Very poor.	Good	Good	Poor	Fair	Good.
536*. Dumps										
581B2----Tamalco	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
787----Banlic	Fair	Good	Good	Good	Good	Fair	Good	Good	Good	Fair.
802B*. Orthents										
821G----Morristown	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
823B----Schuline	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
823C, 823D----Schuline	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
824B----Swanwick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
825C----Lenzburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
850D3*:										
Hickory----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hosmer----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
866*. Dumps										
871B----Lenzburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
871D----Lenzburg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
871G Lenzburg	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
900E*:										
Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
900E3*:										
Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
900G*:										
Wellston	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
912A*:										
Hoyleton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Darmstadt	Fair	Good	Poor	Good	Good	Fair	Fair	Fair	Good	Fair.
912B2*:										
Darmstadt	Fair	Good	Poor	Good	Good	Fair	Poor	Fair	Good	Poor.
Hoyleton	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
916*:										
Oconee	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Darmstadt	Fair	Good	Poor	Good	Good	Fair	Fair	Fair	Good	Fair.
929D3*:										
Hickory	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ava	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
991*:										
Cisne	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Huey	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
1108 Bonnie	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
5002 Cisne	Very poor.	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
5912*:										
Hoyleton	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
Darmstadt	Poor	Fair	Poor	Fair	Fair	Fair	Fair	Poor	Fair	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2: Cisne	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, frost action.	Severe: wetness.
3A, 3B, 3B2: Hoyleton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
4B: Richview	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
4C2: Richview	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
5C3: Blair	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
5D, 5D3: Blair	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
7D3: Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
8E, 8E3, 8G: Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
12: Wynoose	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, frost action.	Severe: wetness.
13A, 13B, 13B2: Bluford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
14B: Ava	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
14C3: Ava	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
26---------------- Wagner	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness.
84---------------- Okaw	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding.	Severe: ponding.
108--------------- Bonnie	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
113--------------- Oconee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
122B2------------- Colp	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, shrink-swell.	Severe: low strength, frost action.	Slight.
164A, 164B, 164B2- Stoy	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
165--------------- Weir	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: ponding.
214B-------------- Hosmer	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Severe: frost action.	Slight.
214C3------------- Hosmer	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell, slope.	Severe: frost action.	Slight.
338--------------- Hurst	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
382--------------- Belknap	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
426--------------- Karnak	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, flooding, too clayey.
536*. Dumps						
581B2------------- Tamalco	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Severe: excess sodium.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
787. Banlic	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
802B*. Orthents						
821G. Morristown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, droughty, slope.
823B. Schuline	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
823C. Schuline	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
823D. Schuline	Moderate: too clayey, dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
824B. Swanwick	Moderate: dense layer, wetness.	Slight	Moderate: wetness.	Slight	Severe: low strength, frost action.	Slight.
825C. Lenzburg	Moderate: dense layer.	Severe: too acid.	Severe: too acid.	Severe: too acid.	Severe: low strength.	Moderate: large stones.
850D3*:						
Hickory	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Hosmer	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
866*. Dumps						
871B. Lenzburg	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
871D. Lenzburg	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
871G. Lenzburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
900E*:						
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
900E*:						
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
900E3*, 900G*:						
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
912A*:						
Hoyleton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
Darmstadt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Severe: excess sodium.
912B2*:						
Darmstadt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Severe: excess sodium.
Hoyleton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
916*:						
Oconee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
Darmstadt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Severe: excess sodium.
929D3*:						
Hickory	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Ava	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
991*:						
Cisne	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, frost action.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
991*:						
Huey	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.
1108 Bonnie	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
5002 Cisne	Severe: ponding.	Severe: subsides, ponding, shrink-swell.	Severe: subsides, ponding, shrink-swell.	Severe: subsides, ponding, shrink-swell.	Severe: subsides, shrink-swell, low strength.	Severe: ponding.
5912*:						
Hoyleton	Severe: ponding.	Severe: subsides, ponding, shrink-swell.	Severe: subsides, ponding, shrink-swell.	Severe: subsides, ponding, shrink-swell.	Severe: low strength, subsides, shrink-swell.	Severe: ponding.
Darmstadt	Severe: ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, low strength, ponding.	Severe: excess sodium, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
2 Cisne	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
3A Hoyleton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
3B, 3B2 Hoyleton	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
4B Richview	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
4C2 Richview	Moderate: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
5C3 Blair	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
5D, 5D3 Blair	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope, wetness.
7D3 Atlas	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
8E, 8E3, 8G Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
12 Wynoose	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
13A Bluford	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
13B, 13B2 Bluford	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
14B Ava	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
14C3 Ava	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
26 Wagner	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
84 Okaw	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
108 Bonnie	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
113 Oconee	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
122B2 Colp	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
164A Stoy	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
164B, 164B2 Stoy	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
165 Weir	Severe: ponding, percs slowly.	Slight	Severe: ponding.	Severe: ponding.	Poor: ponding.
214B Hosmer	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
214C3 Hosmer	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
338 Hurst	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
382 Belknap	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
426 Karnak	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
536*. Dumps					
581B2 Tamalco	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, excess sodium.
787 Banlic	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
802B*. Orthents					
821G Morristown	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
823B Schuline	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
823C Schuline	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
823D Schuline	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
824B Swanwick	Severe: percs slowly.	Moderate: slope, wetness.	Moderate: too clayey.	Slight	Fair: too clayey.
825C Lenzburg	Severe: percs slowly.	Severe: seepage.	Severe: seepage, too acid.	Slight	Fair: too clayey, small stones.
850D3*:					
Hickory	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Hosmer	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
866*. Dumps					
871B Lenzburg	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
871D: Lenzburg	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
871G: Lenzburg	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
900E*:					
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
900E3*, 900G*:					
Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
912A*:					
Hoyleton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Darmstadt	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
912B2*:					
Darmstadt	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Hoyleton	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
916*:					
Oconee	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Darmstadt	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
929D3*:					
Hickory	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Ava	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
991*:					
Cisne	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Huey	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, ponding, excess sodium.
1108 Bonnie	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
5002 Cisne	Severe: subsides, ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
5912*:					
Hoyleton	Severe: subsides, ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Darmstadt	Severe: subsides, ponding, percs slowly.	Severe: ponding.	Severe: ponding, excess sodium.	Severe: ponding.	Poor: hard to pack, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2 Cisne	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
3A, 3B, 3B2 Hoyleton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
4B, 4C2 Richview	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
5C3 Blair	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
5D Blair	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
5D3 Blair	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
7D3 Atlas	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
8E, 8E3 Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
8G Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
12 Wynoose	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
13A, 13B, 13B2 Bluford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
14B Ava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
14C3 Ava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
26 Wagner	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
84 Okaw	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
108------------------- Bonnie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
113------------------- Oconee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
122B2----------------- Colp	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
164A, 164B, 164B2----- Stoy	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
165------------------- Weir	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
214B------------------ Hosmer	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
214C3----------------- Hosmer	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
338------------------- Hurst	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
382------------------- Belknap	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
426------------------- Karnak	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
536*. Dumps				
581B2----------------- Tamalco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
787------------------- Banlic	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
802B*. Orthents				
821G------------------ Morristown	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
823B, 823C------------ Schuline	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
823D Schuline	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
824B Swanwick	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
825C Lenzburg	Good	Probable	Probable	Poor: small stones, area reclaim.
850D3*:				
Hickory	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
Hosmer	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
866*. Dumps				
871B, 871D Lenzburg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
871G Lenzburg	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
900E*:				
Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Wellston	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
900E3*:				
Wellston	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
900G*:				
Wellston	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
900G*:				
Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
912A*:				
Hoyleton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Darmstadt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
912B2*:				
Darmstadt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Hoyleton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
916*:				
Oconee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Darmstadt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
929D3*:				
Hickory	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
Ava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
991*:				
Cisne	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Huey	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
1108 Bonnie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
5002 Cisne	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, wetness.
5912*:				
Hoyleton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, wetness.
Darmstadt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
2 Cisne	Slight	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
3A Hoyleton	Slight	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
3B, 3B2 Hoyleton	Moderate: slope.	Severe: wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
4B, 4C2 Richview	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
5C3 Blair	Moderate: seepage, slope.	Severe: wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
5D, 5D3 Blair	Severe: slope.	Severe: wetness.	Frost action, slope.	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
7D3 Atlas	Severe: slope.	Severe: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, wetness.	Wetness, slope.
8E, 8E3, 8G Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
12 Wynoose	Slight	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
13A Bluford	Slight	Severe: piping.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
13B, 13B2 Bluford	Moderate: slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
14B, 14C3 Ava	Moderate: seepage, slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
26 Wagner	Slight	Severe: wetness.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
84 Okaw	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
108 Bonnie	Slight	Severe: ponding.	Ponding, flooding, frost action.	Ponding, erodes easily, flooding.	Erodes easily, ponding.	Wetness, erodes easily.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
113 Oconee	Slight	Severe: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
122B2 Colp	Moderate: slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
164A Stoy	Slight	Moderate: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
164B, 164B2 Stoy	Moderate: slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
165 Weir	Slight	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
214B, 214C3 Hosmer	Moderate: seepage, slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
338 Hurst	Slight	Severe: wetness.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
382 Belknap	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
426 Karnak	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding, frost action.	Wetness, droughty, slow intake.	Wetness, percs slowly.	Wetness, droughty, percs slowly.
536*. Dumps						
581B2 Tamalco	Moderate: slope.	Severe: hard to pack, excess sodium.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
787 Banlic	Slight	Severe: piping.	Percs slowly, flooding, frost action.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
802B*. Orthents						
821G Morristown	Severe: slope.	Severe: piping.	Deep to water	Large stones, droughty, rooting depth.	Slope, large stones.	Large stones, slope, droughty.
823B, 823C Schuline	Moderate: slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly, rooting depth, slope.	Erodes easily	Erodes easily, rooting depth.
823D Schuline	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Percs slowly, rooting depth, slope.	Slope, erodes easily.	Slope, erodes easily, rooting depth.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
824B------------- Swanwick	Moderate: slope.	Severe: piping.	Deep to water	Percs slowly, rooting depth, slope.	Erodes easily	Erodes easily, rooting depth.
825C------------- Lenzburg	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily, too acid.	Large stones, erodes easily.	Erodes easily.
850D3*:						
Hickory----------	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Hosmer-----------	Severe: slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
866*. Dumps						
871B------------- Lenzburg	Moderate: slope.	Moderate: piping.	Deep to water	Slope----------	Large stones, erodes easily.	Erodes easily.
871D, 871G-------- Lenzburg	Severe: slope.	Moderate: piping.	Deep to water	Slope----------	Slope, large stones, erodes easily.	Slope, erodes easily.
900E*:						
Hickory----------	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Wellston---------	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
900E3*, 900G*:						
Wellston---------	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Hickory----------	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
912A*:						
Hoyleton---------	Slight---------	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness percs slowly.	Wetness, erodes easily, percs slowly.
Darmstadt--------	Slight---------	Severe: excess sodium.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, excess salt.
912B2*:						
Darmstadt--------	Moderate: slope.	Severe: excess sodium.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, excess salt.
Hoyleton---------	Moderate: slope.	Severe: wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
916*:						
Oconee-----------	Slight---------	Severe: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
916*:						
Darmstadt	Slight	Severe: excess sodium.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, excess salt.
929D3*:						
Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Ava	Severe: slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
991*:						
Cisne	Slight	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Huey	Slight	Severe: ponding, excess sodium.	Ponding, percs slowly, frost action.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
1108 Bonnie	Slight	Severe: ponding.	Ponding, flooding, frost action.	Ponding, erodes easily, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
5002 Cisne	Slight	Severe: ponding.	Ponding, percs slowly, subsides.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
5912*:						
Hoyleton	Slight	Severe: ponding.	Percs slowly, subsides, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Darmstadt	Slight	Severe: ponding, excess sodium.	Percs slowly, subsides, frost action.	Ponding, percs slowly, excess sodium.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
2---------------- Cisne	0-20	Silt loam--------	CL, CL-ML, ML	A-4	0	100	100	90-100	90-100	25-35	5-10
	20-51	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	90-100	90-100	45-60	20-35
	51-60	Silty clay loam, sandy loam, silt loam.	CL	A-6, A-7	0-5	100	90-100	70-95	50-90	30-50	15-30
3A, 3B, 3B2------ Hoyleton	0-12	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	12-36	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-55	20-30
	36-60	Silt loam, loam, silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	95-100	90-100	70-95	20-45	5-25
4B, 4C2---------- Richview	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	7-37	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	35-50	15-30
	37-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	90-100	90-100	80-95	25-45	10-20
5C3-------------- Blair	0-7	Silty clay loam	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-100	25-40	10-20
	7-10	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	90-100	70-100	30-50	15-30
	10-39	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	85-100	70-95	30-50	15-30
	39-60	Silty clay loam, clay loam, silt loam.	CL	A-6	0-5	95-100	90-100	85-100	70-90	20-40	10-25
5D--------------- Blair	0-14	Silt loam--------	CL-ML, CL	A-4, A-6	0-2	95-100	90-100	90-100	85-95	20-35	5-15
	14-46	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	90-100	70-90	30-50	15-30
	46-60	Silty clay loam, clay loam, silt loam.	CL	A-6	0-5	95-100	90-100	85-100	70-90	20-40	10-25
5D3-------------- Blair	0-5	Silty clay loam	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-100	25-40	10-20
	5-20	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	90-100	70-100	30-50	15-30
	20-47	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	90-100	85-100	70-95	30-50	15-30
	47-60	Silty clay loam, clay loam, silt loam.	CL	A-6	0-5	95-100	90-100	85-100	70-90	20-40	10-25
7D3-------------- Atlas	0-5	Silty clay loam	CH, CL	A-7	0	100	100	95-100	75-95	45-65	30-40
	5-30	Silty clay loam, silty clay, clay loam.	CH	A-7	0	100	95-100	95-100	80-95	50-70	30-45
	30-60	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	80-95	50-70	30-45

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
8E--------------- Hickory	0-7	Silt loam--------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	7-42	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	42-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8E3-------------- Hickory	0-6	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	70-85	30-50	15-30
	6-34	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	34-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8G--------------- Hickory	0-4	Silt loam--------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	4-60	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
12--------------- Wynoose	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	20-35	5-15
	7-16	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	85-95	15-30	2-15
	16-34	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	20-35
	34-50	Silt loam, clay loam, silty clay loam.	CL	A-6, A-7	0	100	95-100	90-100	70-90	30-45	15-25
	50-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-100	70-90	25-45	15-30
13A, 13B, 13B2--- Bluford	0-7	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	95-100	95-100	90-100	20-35	5-15
	7-13	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	95-100	90-100	20-30	NP-10
	13-37	Silty clay loam, silty clay.	CL	A-7, A-6	0	100	95-100	95-100	90-100	35-50	15-30
	37-60	Silt loam, loam, silty clay loam.	CL-ML, CL	A-6, A-4	0-5	100	95-100	90-100	70-95	25-40	5-20
14B-------------- Ava	0-14	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	90-100	25-35	8-15
	14-28	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	28-41	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	41-60	Silty clay loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	90-100	20-45	5-20
14C3------------- Ava	0-4	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	4-29	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	29-51	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-90	20-45	5-20
	51-60	Loam, silt loam, clay loam.	CL	A-4, A-6	0	100	95-100	90-100	90-100	25-40	7-20

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
26----------------- Wagner	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	24-35	6-15
	9-18	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	18-60	Silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	45-60	25-40
84----------------- Okaw	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	11-53	Silty clay, clay, silty clay loam.	CH	A-7	0	100	95-100	95-100	85-100	50-70	30-50
	53-60	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	100	100	95-100	80-100	45-65	20-35
108---------------- Bonnie	0-6	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	6-26	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	26-60	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	80-100	25-39	8-15
113---------------- Oconee	0-9	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	9-16	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	20-35	8-20
	16-43	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	43-53	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-25
	53-60	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	85-100	20-35	8-20
122B2-------------- Colp	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	6-27	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	27-60	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0	100	100	95-100	85-100	35-60	15-40
164A, 164B, 164B2------------ Stoy	0-15	Silt loam--------	ML, CL	A-6	0	100	100	95-100	90-100	30-40	10-15
	15-44	Silty clay loam	CL	A-7	0	100	100	95-100	90-100	40-50	22-32
	44-53	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	35-50	15-25
	53-60	Silt loam--------	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	13-25
165---------------- Weir	0-5	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	5-17
	5-14	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	95-100	90-100	<25	3-10
	14-47	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-30
	47-60	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	20-30	9-16
214B-------------- Hosmer	0-10	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	90-100	70-90	<25	3-10
	10-36	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	36-60	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
214C3------------- Hosmer	0-5	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-35	10-15
	5-35	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	35-60	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
338------------- Hurst	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-35	6-15
	8-15	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	20-35	5-15
	15-49	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	49-60	Stratified sandy clay loam to silty clay.	CL, CH	A-6, A-7	0	100	100	90-100	85-100	35-55	15-30
382------------- Belknap	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	80-100	20-30	2-8
	9-60	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	80-100	20-35	NP-12
426------------- Karnak	0-3	Silty clay-------	CH, CL, MH, ML	A-7	0	100	100	95-100	95-100	45-80	20-40
	3-60	Silty clay, clay	CH, MH, CL, ML	A-7	0	100	100	95-100	95-100	45-80	20-40
536*. Dumps											
581B2----------- Tamalco	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	6-25	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	95-100	55-75	35-45
	25-46	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	30-50	15-25
	46-60	Silt loam, loam, clay loam.	CL	A-6	0	100	100	95-100	80-100	30-40	15-25
787------------- Banlic	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-95	20-30	3-10
	8-21	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	90-100	85-95	20-30	3-10
	21-38	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	95-100	90-100	85-95	20-30	3-10
	38-60	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	90-100	85-95	20-30	3-10
802B*. Orthents											
821G------------ Morristown	0-2	Cobbly silty clay loam.	CL, GC, SC	A-7, A-6	25-50	70-95	50-80	50-75	40-70	35-50	12-24
	2-60	Very bouldery clay loam, cobbly clay loam, channery clay loam.	GC, CL, CL-ML, GM-GC	A-7, A-6, A-4, A-2	10-40	40-75	30-65	25-65	20-60	25-50	4-24
823B------------ Schuline	0-10	Silt loam--------	CL-ML, CL	A-6, A-4	0	100	95-100	90-100	85-95	25-40	5-15
	10-21	Loam, silty clay loam, clay loam.	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-85	30-50	10-25
	21-54	Loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	0-15	85-95	80-90	75-85	60-80	25-50	7-25
	54-60	Loam, clay loam, silty clay.	ML, CL, CH, MH	A-6, A-7	0-15	85-95	80-90	75-85	60-80	35-55	10-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
823C------------- Schuline	0-9	Silt loam--------	CL-ML, CL	A-6, A-4	0	100	95-100	90-100	85-95	25-40	5-15
	9-22	Loam, silty clay loam, clay loam.	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-85	30-50	10-25
	22-60	Loam, clay loam, silty clay.	ML, CL, CH, MH	A-6, A-7	0-15	85-95	80-90	75-85	60-80	35-55	10-30
823D------------- Schuline	0-8	Silt loam--------	CL-ML, CL	A-6, A-4	0	100	95-100	90-100	85-95	25-40	5-15
	8-16	Loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	0-15	85-95	80-90	75-85	60-80	25-50	7-25
	16-60	Loam, clay loam, silty clay.	ML, CL, CH, MH	A-6, A-7	0-15	85-95	80-90	75-85	60-80	35-55	10-30
824B------------- Swanwick	0-10	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	7-20
	10-18	Silty clay loam, silt loam, loam.	CL-ML, ML, CL	A-4, A-6, A-7	0	95-100	90-100	90-100	85-95	25-50	5-20
	18-32	Silty clay loam, clay loam.	ML, CL	A-6, A-7	0	95-100	90-100	85-100	80-95	35-50	10-25
	32-40	Silty clay loam, silt loam, loam.	ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	80-95	30-50	7-25
	40-60	Silty clay loam, clay loam, gravelly loam.	ML, CL-ML, CL	A-4, A-6	0-5	90-100	90-100	85-95	70-80	20-40	2-20
825C------------- Lenzburg	0-9	Silty clay loam	CL	A-6, A-7, A-4	2-10	80-95	75-90	65-90	55-85	25-45	8-25
	9-55	Silty clay loam, silt loam, gravelly loam.	CL	A-6, A-7	5-15	75-95	70-90	65-85	60-85	25-45	10-25
	55-60	Fragmental material.	GW-GM, SW-SM, GP-GM	A-1	5-25	30-70	10-50	5-15	5-10	---	NP
850D3*: Hickory---------	0-8	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	70-85	30-50	15-30
	8-60	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
Hosmer----------	0-6	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-35	10-15
	6-60	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
866*. Dumps											
871B, 871D, 871G- Lenzburg	0-3	Gravelly silty clay loam.	CL	A-6, A-7, A-4	3-15	80-95	75-90	65-90	55-85	25-45	8-25
	3-26	Silty clay loam, silt loam, gravelly loam.	CL	A-6, A-7	5-15	75-95	70-90	65-85	60-85	25-45	10-25
	26-60	Silty clay, gravelly silty clay loam, gravelly clay loam.	CL, CH	A-6, A-7	5-25	70-95	60-90	55-90	50-90	30-55	15-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
900E*:											
Hickory---------	0-7	Silt loam--------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	7-42	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	42-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
Wellston--------	0-4	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	4-16	Silt loam, clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	16-39	Clay loam, loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	39-46	Very channery loam, gravelly sandy loam, silty clay loam.	SM-SC, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
900E3*:											
Wellston--------	0-7	Silty clay loam	CL	A-6	0-5	95-100	90-100	85-100	75-95	30-40	10-20
	7-38	Silt loam, clay loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	38-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hickory---------	0-6	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	70-85	30-50	15-30
	6-34	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	34-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
900G*:											
Wellston--------	0-4	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	4-24	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	24-37	Silty clay loam, clay loam, loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	37-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hickory---------	0-4	Silt loam--------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	4-60	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
912A*:											
Hoyleton--------	0-15	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	15-42	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-55	20-30
	42-60	Silt loam, loam, silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	95-100	90-100	70-95	20-45	5-25

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
912A*:											
Darmstadt-------	0-18	Silt loam--------	CL, ML	A-6, A-7	0	95-100	95-100	95-100	75-100	25-45	10-20
	18-35	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	35-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	95-100	95-100	90-100	75-100	20-50	7-30
912B2*:											
Darmstadt-------	0-18	Silt loam--------	CL, ML	A-6, A-7	0	95-100	95-100	95-100	75-100	25-45	10-20
	18-35	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	35-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	95-100	95-100	90-100	75-100	20-50	7-30
Hoyleton---------	0-15	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	15-42	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-55	20-30
	42-60	Silt loam, loam, silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	95-100	90-100	70-95	20-45	5-25
916*:											
Oconee----------	0-9	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	9-16	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	20-35	8-20
	16-43	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-60	20-35
	43-53	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-25
	53-60	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	85-100	20-35	8-20
Darmstadt-------	0-18	Silt loam--------	CL, ML	A-6, A-7	0	95-100	95-100	95-100	75-100	25-45	10-20
	18-35	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	35-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	95-100	95-100	90-100	75-100	20-50	7-30
929D3*:											
Hickory---------	0-8	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-95	70-85	30-50	15-30
	8-60	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
Ava-------------	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	6-25	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	25-47	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-90	20-45	5-20
	47-60	Loam, silt loam, clay loam.	CL	A-4, A-6	0	100	95-100	90-100	80-90	25-40	7-20
991*:											
Cisne-----------	0-20	Silt loam--------	CL, CL-ML, ML	A-4	0	100	100	90-100	90-100	25-35	5-10
	20-51	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	90-100	90-100	45-60	20-35
	51-60	Silty clay loam, sandy loam, silt loam.	CL	A-6, A-7	0-5	100	90-100	70-95	50-90	30-50	15-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
991*:											
Huey	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	85-95	20-35	3-15
	9-12	Silt, silt loam	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	85-95	15-30	3-15
	12-22	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-25
	22-45	Silt loam, silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	15-30
	45-60	Loam, silt loam, silty clay loam.	CL	A-6	0	95-100	90-100	80-95	65-90	20-35	10-20
1108 Bonnie	0-6	Silt loam	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	6-26	Silt loam	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	26-60	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	80-100	25-39	8-15
5002 Cisne	0-20	Silt loam	CL, CL-ML, ML	A-4	0	100	100	90-100	90-100	25-35	5-10
	20-51	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	90-100	90-100	45-60	20-35
	51-60	Silty clay loam, sandy loam, silt loam.	CL	A-6, A-7	0-5	100	90-100	70-95	50-90	30-50	15-30
5912*:											
Hoyleton	0-15	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	15-42	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-55	20-30
	42-60	Silt loam, loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	95-100	90-100	70-95	20-45	5-25
Darmstadt	0-18	Silt loam	CL, ML	A-6, A-7	0	95-100	95-100	95-100	75-100	25-45	10-20
	18-44	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	44-60	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	95-100	95-100	90-100	75-100	20-50	7-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
2-----------------	0-20	15-27	1.30-1.50	0.06-0.6	0.22-0.24	4.5-7.8	Low----------	0.37	3	6	1-3
Cisne	20-51	35-45	1.40-1.60	<0.06	0.09-0.15	4.5-6.0	High---------	0.37			
	51-60	25-37	1.50-1.70	<0.06	0.08-0.14	5.1-6.5	Moderate-----	0.37			
3A, 3B, 3B2------	0-12	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Moderate-----	0.32	3	6	1-3
Hoyleton	12-36	35-45	1.40-1.65	0.06-0.2	0.13-0.20	4.5-6.0	High---------	0.43			
	36-60	15-33	1.35-1.70	0.06-0.2	0.17-0.22	5.1-7.3	Moderate-----	0.43			
4B, 4C2----------	0-7	20-27	1.20-1.40	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	5	6	1-3
Richview	7-37	27-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-7.3	Moderate-----	0.43			
	37-60	22-35	1.50-1.70	0.6-2.0	0.14-0.20	4.5-6.5	Moderate-----	0.43			
5C3--------------	0-7	27-35	1.40-1.60	0.2-0.6	0.16-0.21	5.1-7.3	Moderate-----	0.37	3	6	.5-1
Blair	7-10	25-35	1.45-1.60	0.2-0.6	0.16-0.21	4.5-6.0	Moderate-----	0.37			
	10-39	25-35	1.45-1.60	0.2-0.6	0.16-0.21	5.1-7.8	Moderate-----	0.37			
	39-60	20-27	1.35-1.60	0.6-2.0	0.19-0.22	5.6-7.8	Low----------	0.37			
5D---------------	0-14	20-27	1.30-1.50	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.37	4	6	1-3
Blair	14-46	25-35	1.45-1.60	0.2-0.6	0.16-0.21	4.5-6.0	Moderate-----	0.37			
	46-60	20-27	1.35-1.60	0.6-2.0	0.19-0.22	5.6-7.8	Low----------	0.37			
5D3--------------	0-5	27-35	1.40-1.60	0.2-0.6	0.16-0.21	5.1-7.3	Moderate-----	0.37	3	6	.5-1
Blair	5-20	25-35	1.45-1.60	0.2-0.6	0.16-0.21	4.5-6.0	Moderate-----	0.37			
	20-47	25-35	1.45-1.60	0.2-0.6	0.16-0.21	5.1-7.8	Moderate-----	0.37			
	47-60	20-27	1.35-1.60	0.6-2.0	0.19-0.22	5.6-7.8	Low----------	0.37			
7D3--------------	0-5	30-40	1.45-1.65	0.06-0.2	0.18-0.20	5.6-7.3	High---------	0.32	2	7	.5-2
Atlas	5-30	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High---------	0.32			
	30-60	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High---------	0.32			
8E---------------	0-7	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37	5	6	1-2
Hickory	7-42	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	42-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low----------	0.37			
8E3--------------	0-6	27-35	1.40-1.65	0.6-2.0	0.17-0.19	4.5-7.3	Moderate-----	0.37	4	4	.5-1
Hickory	6-34	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	34-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low----------	0.37			
8G---------------	0-4	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37	5	6	1-2
Hickory	4-60	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
12---------------	0-7	15-25	1.25-1.45	0.6-2.0	0.22-0.24	4.5-7.8	Low----------	0.43	3	6	.5-2
Wynoose	7-16	12-18	1.30-1.50	0.2-0.6	0.18-0.20	3.6-7.3	Low----------	0.43			
	16-34	35-42	1.40-1.60	<0.06	0.09-0.13	3.6-6.0	High---------	0.43			
	34-50	25-37	1.50-1.70	0.06-0.2	0.11-0.15	3.6-6.0	Moderate-----	0.43			
	50-60	20-35	1.60-1.80	0.06-0.2	0.10-0.16	4.5-6.0	Moderate-----	0.43			
13A, 13B, 13B2---	0-7	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	6	1-3
Bluford	7-13	15-25	1.40-1.60	0.2-0.6	0.18-0.20	4.5-6.0	Low----------	0.43			
	13-37	35-42	1.45-1.65	0.2-0.6	0.11-0.20	4.5-5.5	Moderate-----	0.43			
	37-60	22-35	1.60-1.70	0.06-0.2	0.11-0.16	4.5-6.0	Moderate-----	0.43			
14B--------------	0-14	20-27	1.30-1.50	0.6-2.0	0.20-0.23	4.5-7.3	Low----------	0.43	4	6	.5-2
Ava	14-28	22-33	1.40-1.60	0.6-2.0	0.18-0.21	4.5-5.5	Moderate-----	0.43			
	28-41	24-35	1.50-1.70	0.2-0.6	0.18-0.21	4.5-5.5	Moderate-----	0.43			
	41-60	20-30	1.65-1.80	<0.06	0.09-0.11	4.5-5.5	Low----------	0.43			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
14C3------------- Ava	0-4	27-35	1.25-1.45	0.6-2.0	0.18-0.20	4.5-7.3	Moderate-----	0.43	3	7	.5-2
	4-29	24-35	1.50-1.70	0.2-0.6	0.18-0.21	4.5-5.5	Moderate-----	0.43			
	29-51	20-30	1.65-1.80	<0.06	0.09-0.11	4.5-5.5	Low----------	0.43			
	51-60	20-30	1.55-1.75	0.2-0.6	0.15-0.18	4.5-6.0	Low----------	0.43			
26--------------- Wagner	0-9	20-25	1.35-1.55	0.2-0.6	0.22-0.24	5.1-8.4	Low----------	0.28	3	6	2-3
	9-18	18-25	1.35-1.55	0.2-0.6	0.20-0.22	5.1-8.4	Low----------	0.28			
	18-60	35-47	1.35-1.55	<0.06	0.09-0.20	4.5-7.3	High---------	0.28			
84--------------- Okaw	0-11	15-27	1.20-1.40	0.2-0.6	0.22-0.24	4.5-7.3	Low----------	0.43	3	6	1-3
	11-53	40-60	1.35-1.60	<0.06	0.09-0.18	4.5-6.0	High---------	0.32			
	53-60	35-55	1.50-1.70	<0.06	0.08-0.20	3.6-8.4	High---------	0.32			
108-------------- Bonnie	0-6	18-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	5	6	1-3
	6-26	18-27	1.40-1.60	0.2-0.6	0.20-0.22	4.5-5.5	Low----------	0.43			
	26-60	18-30	1.45-1.65	0.2-0.6	0.18-0.20	4.5-7.8	Low----------	0.43			
113-------------- Oconee	0-9	20-27	1.20-1.30	0.2-0.6	0.22-0.24	5.6-7.8	Moderate-----	0.32	3-2	6	2-3
	9-16	18-27	1.30-1.45	0.06-0.2	0.20-0.22	4.5-7.3	Moderate-----	0.43			
	16-43	35-42	1.30-1.50	0.06-0.2	0.11-0.17	4.5-6.5	High---------	0.43			
	43-53	20-35	1.40-1.60	0.06-0.2	0.16-0.21	5.1-7.3	Moderate-----	0.43			
	53-60	17-27	1.40-1.60	0.06-0.2	0.20-0.22	5.6-8.4	Moderate-----	0.43			
122B2------------ Colp	0-6	20-27	1.25-1.45	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.43	3	6	1-2
	6-27	35-50	1.45-1.70	0.06-0.2	0.10-0.17	4.5-5.0	High---------	0.32			
	27-60	30-45	1.50-1.70	0.06-0.2	0.10-0.18	4.5-8.4	High---------	0.32			
164A, 164B, 164B2----------- Stoy	0-15	20-27	1.20-1.40	0.2-0.6	0.22-0.24	4.5-6.5	Low----------	0.43	4	6	1-2
	15-44	27-35	1.35-1.55	0.06-0.2	0.18-0.20	4.5-5.5	Moderate-----	0.43			
	44-53	27-35	1.55-1.75	0.06-0.2	0.09-0.12	4.5-5.5	Moderate-----	0.43			
	53-60	20-27	1.55-1.75	0.06-0.2	0.10-0.15	4.5-6.0	Low----------	0.43			
165-------------- Weir	0-5	12-27	1.30-1.50	0.2-0.6	0.22-0.24	4.5-7.3	Low----------	0.43	4	6	1-3
	5-14	12-20	1.40-1.55	0.06-0.2	0.17-0.20	4.5-7.3	Low----------	0.43			
	14-47	35-40	1.40-1.60	<0.06	0.18-0.20	4.5-5.5	High---------	0.43			
	47-60	20-27	1.45-1.65	0.06-0.2	0.20-0.22	4.5-6.5	Low----------	0.43			
214B------------- Hosmer	0-10	10-17	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	4	5	1-2
	10-36	24-30	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.43			
	36-60	16-26	1.60-1.70	<0.06	0.06-0.08	4.5-6.0	Low----------	0.43			
214C3------------ Hosmer	0-5	27-30	1.30-1.50	0.6-2.0	0.21-0.23	4.5-6.5	Moderate-----	0.43	4	7	.5-2
	5-35	24-30	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.43			
	35-60	16-26	1.60-1.70	<0.06	0.06-0.08	4.5-6.0	Low----------	0.43			
338-------------- Hurst	0-8	20-27	1.25-1.45	0.2-0.6	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	1-2
	8-15	18-30	1.30-1.50	0.2-0.6	0.20-0.22	3.6-6.0	Low----------	0.43			
	15-49	35-48	1.45-1.70	<0.06	0.10-0.17	3.6-7.3	High---------	0.32			
	49-60	20-45	1.50-1.70	<0.06	0.10-0.18	4.5-7.8	High---------	0.32			
382-------------- Belknap	0-9	8-18	1.30-1.50	0.2-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	5	1-3
	9-60	8-25	1.25-1.50	0.2-0.6	0.20-0.22	4.5-6.0	Low----------	0.37			
426-------------- Karnak	0-3	40-60	1.20-1.40	0.06-0.2	0.11-0.14	5.6-7.3	High---------	0.32	5	4	2-3
	3-60	40-60	1.30-1.50	<0.2	0.09-0.13	5.1-7.3	High---------	0.32			
536*. Dumps											

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
581B2------------ Tamalco	0-6	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	6	2-3
	6-25	35-45	1.35-1.60	<0.06	0.09-0.14	4.5-7.8	High---------	0.43			
	25-46	20-35	1.50-1.70	<0.06	0.07-0.11	7.4-9.0	Moderate-----	0.43			
	46-60	20-30	1.55-1.75	<0.06	0.02-0.12	7.4-9.0	Moderate-----	0.43			
787-------------- Banlic	0-8	10-18	1.30-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.43	3	5	.5-1
	8-21	12-18	1.40-1.60	0.06-0.2	0.20-0.22	4.5-7.3	Low----------	0.43			
	21-38	10-18	1.65-1.80	0.06-0.2	0.10-0.11	4.5-6.0	Low----------	0.43			
	38-60	12-18	1.50-1.70	0.2-0.6	0.20-0.22	4.5-6.5	Low----------	0.43			
802B*. Orthents											
821G------------- Morristown	0-2	27-40	1.50-1.75	0.2-0.6	0.07-0.14	6.1-8.4	Moderate-----	0.32	5	8	<.5
	2-60	25-35	1.65-1.90	0.2-0.6	0.03-0.11	7.4-8.4	Moderate-----	0.32			
823B------------- Schuline	0-10	15-27	1.30-1.50	0.6-2.0	0.20-0.23	5.6-8.4	Moderate-----	0.37	5	5	.5-2
	10-21	18-35	1.60-1.80	0.06-0.2	0.08-0.12	7.4-8.4	Moderate-----	0.37			
	21-54	18-35	1.40-1.70	0.2-0.6	0.15-0.21	7.4-8.4	Moderate-----	0.37			
	54-60	20-45	1.60-1.90	0.06-0.6	0.08-0.18	7.4-8.4	Moderate-----	0.37			
823C------------- Schuline	0-9	15-27	1.30-1.50	0.6-2.0	0.20-0.23	5.6-8.4	Moderate-----	0.37	5	5	.5-2
	9-22	18-35	1.60-1.80	0.06-0.2	0.08-0.12	7.4-8.4	Moderate-----	0.37			
	22-60	20-45	1.60-1.90	0.06-0.6	0.08-0.18	7.4-8.4	Moderate-----	0.37			
823D------------- Schuline	0-8	15-27	1.30-1.50	0.6-2.0	0.20-0.23	5.6-8.4	Moderate-----	0.37	5	5	.5-2
	8-16	18-35	1.40-1.70	0.2-0.6	0.15-0.21	7.4-8.4	Moderate-----	0.37			
	16-60	20-45	1.60-1.90	0.06-0.6	0.08-0.18	7.4-8.4	Moderate-----	0.37			
824B------------- Swanwick	0-10	18-27	1.30-1.60	0.2-0.6	0.20-0.22	5.1-7.8	Low----------	0.43	5	6	.5-1
	10-18	15-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-8.4	Low----------	0.43			
	18-32	27-35	1.60-1.90	<0.06	0.05-0.12	4.5-8.4	Moderate-----	0.43			
	32-40	18-35	1.50-1.70	0.2-0.6	0.15-0.19	4.5-8.4	Low----------	0.43			
	40-60	15-35	1.60-2.00	<0.06	0.03-0.18	4.5-8.4	Low----------	0.43			
825C------------- Lenzburg	0-9	20-35	1.30-1.60	0.2-2.0	0.17-0.20	6.6-8.4	Moderate-----	0.37	4	4L	.5-1
	9-55	20-35	1.40-1.70	0.2-0.6	0.11-0.17	6.6-8.4	Moderate-----	0.37			
	55-60	0-5	1.50-2.00	0.6-6.0	0.01-0.07	<3.6	Low----------	0.17			
850D3*: Hickory---------	0-8	27-35	1.40-1.65	0.6-2.0	0.17-0.19	4.5-7.3	Moderate-----	0.37	4	4	.5-1
	8-60	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
Hosmer----------	0-6	27-30	1.30-1.50	0.6-2.0	0.21-0.23	4.5-6.5	Moderate-----	0.43	4	7	.5-2
	6-60	24-30	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.43			
866*. Dumps											
871B, 871D, 871G- Lenzburg	0-3	20-35	1.30-1.60	0.6-2.0	0.15-0.19	6.6-8.4	Moderate-----	0.28	5	8	---
	3-26	20-35	1.40-1.70	0.2-0.6	0.11-0.17	7.4-8.4	Moderate-----	0.37			
	26-60	25-45	1.40-1.70	0.2-0.6	0.08-0.18	7.4-8.4	High---------	0.37			
900E*: Hickory---------	0-7	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37	5	6	1-2
	7-42	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	42-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-7.3	Low----------	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
900E*:											
Wellston--------	0-4	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low----------	0.37	4	6	1-3
	4-16	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.37			
	16-39	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.6	Low----------	0.37			
	39-46	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-7.8	Low----------	0.20			
	46-60	---	---	---	---	---	-------------	----			
900E3*:											
Wellston--------	0-7	27-32	1.35-1.55	0.6-2.0	0.17-0.21	5.1-6.5	Low----------	0.37	3	7	.5-2
	7-38	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-7.8	Low----------	0.37			
	38-60	---	---	---	---	---	-------------	----			
Hickory---------	0-6	27-35	1.40-1.65	0.6-2.0	0.17-0.19	4.5-7.3	Moderate-----	0.37	4	4	.5-1
	6-34	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	34-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-7.3	Low----------	0.37			
900G*:											
Wellston--------	0-4	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low----------	0.37	4	6	1-3
	4-24	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.37			
	24-37	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-7.8	Low----------	0.37			
	37-60	---	---	---	---	---	-------------	----			
Hickory---------	0-4	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.37	5	6	1-2
	4-60	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
912A*:											
Hoyleton--------	0-15	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Moderate-----	0.32	3	6	1-3
	15-42	35-45	1.40-1.65	0.06-0.2	0.13-0.20	4.5-6.0	High---------	0.43			
	42-60	15-33	1.35-1.70	0.06-0.2	0.17-0.22	5.1-7.3	Moderate-----	0.43			
Darmstadt-------	0-18	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-2
	18-35	27-35	1.40-1.65	<0.06	0.09-0.10	4.5-7.8	Moderate-----	0.43			
	35-60	15-25	1.50-1.70	<0.06	0.10-0.15	7.4-9.0	Low----------	0.43			
912B2*:											
Darmstadt-------	0-18	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-2
	18-35	27-35	1.40-1.65	<0.06	0.09-0.10	4.5-7.8	Moderate-----	0.43			
	35-60	15-25	1.50-1.70	<0.06	0.10-0.15	7.4-9.0	Low----------	0.43			
Hoyleton--------	0-15	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Moderate-----	0.32	3	6	1-3
	15-42	35-45	1.40-1.65	0.06-0.2	0.13-0.20	4.5-6.0	High---------	0.43			
	42-60	15-33	1.35-1.70	0.06-0.2	0.17-0.22	5.1-7.3	Moderate-----	0.43			
916*:											
Oconee----------	0-9	20-27	1.20-1.30	0.2-0.6	0.22-0.24	5.6-7.8	Moderate-----	0.32	3-2	6	2-3
	9-16	18-27	1.30-1.45	0.06-0.2	0.20-0.22	4.5-7.3	Moderate-----	0.43			
	16-43	35-42	1.30-1.50	0.06-0.2	0.11-0.17	4.5-6.0	High---------	0.43			
	43-53	20-35	1.40-1.60	0.06-0.2	0.16-0.21	5.1-6.5	Moderate-----	0.43			
	53-60	17-27	1.40-1.60	0.06-0.2	0.20-0.22	5.6-8.4	Moderate-----	0.43			
Darmstadt-------	0-18	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-2
	18-35	27-35	1.40-1.65	<0.06	0.09-0.10	4.5-7.8	Moderate-----	0.43			
	35-60	15-25	1.50-1.70	<0.06	0.10-0.15	7.4-9.0	Low----------	0.43			
929D3*:											
Hickory---------	0-8	27-35	1.40-1.65	0.6-2.0	0.17-0.19	4.5-7.3	Moderate-----	0.37	4	4	.5-1
	8-60	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
929D3*:											
Ava-------------	0-6	27-35	1.25-1.45	0.6-2.0	0.18-0.20	4.5-7.3	Moderate-----	0.43	3	7	.5-2
	6-25	24-35	1.50-1.70	0.2-0.6	0.18-0.21	4.5-5.5	Moderate-----	0.43			
	25-47	20-30	1.65-1.80	<0.06	0.09-0.11	4.5-5.5	Low----------	0.43			
	47-60	20-30	1.55-1.75	0.2-0.6	0.15-0.18	4.5-6.0	Low----------	0.43			
991*:											
Cisne-----------	0-20	15-27	1.30-1.50	0.06-0.6	0.22-0.24	4.5-7.8	Low----------	0.37	3	6	1-3
	20-51	35-45	1.40-1.60	<0.06	0.09-0.15	4.5-6.0	High---------	0.37			
	51-60	25-37	1.50-1.70	<0.06	0.08-0.14	5.1-6.5	Moderate-----	0.37			
Huey------------	0-9	15-27	1.35-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.43	2	6	1-3
	9-12	11-25	1.40-1.55	0.06-0.2	0.20-0.22	5.1-7.8	Low----------	0.43			
	12-22	20-35	1.40-1.60	0.06-0.2	0.10-0.18	5.6-8.4	Moderate-----	0.43			
	22-45	25-35	1.45-1.65	<0.06	0.05-0.08	7.4-9.0	Moderate-----	0.43			
	45-60	18-35	1.55-1.75	0.06-0.2	0.10-0.15	6.6-8.4	Moderate-----	0.43			
1108------------- Bonnie	0-6	18-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	5	6	1-3
	6-26	18-27	1.40-1.60	0.2-0.6	0.20-0.22	4.5-5.5	Low----------	0.43			
	26-60	18-30	1.45-1.65	0.2-0.6	0.18-0.20	4.5-7.8	Low----------	0.43			
5002------------- Cisne	0-20	15-27	1.30-1.50	0.06-0.6	0.22-0.24	4.5-7.8	Low----------	0.37	3	6	1-3
	20-51	35-45	1.40-1.60	<0.06	0.09-0.15	4.5-6.0	High---------	0.37			
	51-60	25-37	1.50-1.70	<0.06	0.08-0.14	5.1-6.5	Moderate-----	0.37			
5912*:											
Hoyleton--------	0-15	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Moderate-----	0.32	3	6	1-3
	15-42	35-45	1.40-1.65	0.06-0.2	0.13-0.20	4.5-5.5	High---------	0.43			
	42-60	15-33	1.35-1.70	0.06-0.2	0.17-0.22	5.1-7.3	Moderate-----	0.43			
Darmstadt-------	0-18	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-2
	18-44	27-35	1.40-1.65	<0.06	0.09-0.10	4.5-7.8	Moderate-----	0.43			
	44-60	15-25	1.50-1.70	<0.06	0.10-0.15	7.4-9.0	Low----------	0.43			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
2---------------- Cisne	D	None--------	---	---	0-2.0	Perched	Feb-Jun	High-----	High-----	Moderate.
3A, 3B, 3B2------- Hoyleton	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
4B, 4C2----------- Richview	C	None--------	---	---	4.0-6.0	Apparent	Feb-May	High-----	Moderate	High.
5C3, 5D, 5D3------ Blair	C	None--------	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	High.
7D3--------------- Atlas	D	None--------	---	---	0-2.0	Perched	Apr-Jun	High-----	High-----	Moderate.
8E, 8E3, 8G------- Hickory	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
12---------------- Wynoose	D	None--------	---	---	0-2.0	Perched	Mar-Jun	High-----	High-----	High.
13A, 13B, 13B2---- Bluford	C	None--------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	High.
14B, 14C3--------- Ava	C	None--------	---	---	2.0-4.0	Perched	Mar-Jun	High-----	Moderate	High.
26---------------- Wagner	D	Rare--------	---	---	0-2.0	Apparent	Mar-Jun	Moderate	High-----	High.
84---------------- Okaw	D	Rare--------	---	---	+.5-1.0	Apparent	Mar-Jun	High-----	High-----	High.
108--------------- Bonnie	C/D	Frequent----	Long------	Jan-May	+.5-1.0	Apparent	Jan-Jun	High-----	High-----	High.
113--------------- Oconee	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
122B2------------- Colp	C	Rare--------	---	---	2.0-4.0	Apparent	Mar-Jun	High-----	High-----	High.
164A, 164B, 164B2- Stoy	C	None--------	---	---	1.0-3.0	Perched	Feb-Apr	High-----	High-----	High.
165--------------- Weir	D	None--------	---	---	+.5-2.0	Perched	Feb-Jun	High-----	High-----	High.
214B, 214C3------- Hosmer	C	None--------	---	---	2.5-3.0	Perched	Mar-Apr	High-----	Moderate	High.
338--------------- Hurst	D	Rare--------	---	---	1.0-3.0	Apparent	Feb-Apr	Moderate	High-----	High.
382--------------- Belknap	C	Frequent----	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Jun	High-----	High-----	High.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
426----------------- Karnak	D	Frequent----	Long------	Mar-May	0-3.0	Apparent	Apr-Jun	High-----	High-----	Moderate.
536*. Dumps										
581B2--------------- Tamalco	D	None--------	---	---	3.0-5.0	Apparent	Feb-Apr	High-----	High-----	Low.
787----------------- Banlic	C	Frequent----	Brief-----	Feb-Apr	1.0-3.0	Perched	Jan-Jun	High-----	High-----	High.
802B*. Orthents										
821G---------------- Morristown	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
823B, 823C, 823D-- Schuline	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
824B---------------- Swanwick	D	None--------	---	---	4.0-6.0	Perched	Feb-Apr	High-----	Moderate	High.
825C---------------- Lenzburg	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
850D3*: Hickory----------	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Hosmer-----------	C	None--------	---	---	2.5-3.0	Perched	Mar-Apr	High-----	Moderate	High.
866*. Dumps										
871B, 871D, 871G-- Lenzburg	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
900E*: Hickory----------	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Wellston---------	B	None--------	---	---	>6.0	---	---	High-----	Moderate	High.
900E3*, 900G*: Wellston---------	B	None--------	---	---	>6.0	---	---	High-----	Moderate	High.
Hickory----------	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
912A*: Hoyleton---------	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
Darmstadt--------	D	None--------	---	---	1.0-3.0	Perched	Feb-May	High-----	High-----	High.
912B2*: Darmstadt--------	D	None--------	---	---	1.0-3.0	Perched	Feb-May	High-----	High-----	High.
Hoyleton---------	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
916*: Oconee-----------	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
916*:										
Darmstadt--------	D	None--------	---	---	1.0-3.0	Perched	Feb-May	High-----	High-----	High.
929D3*:										
Hickory----------	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Ava--------------	C	None--------	---	---	2.0-4.0	Perched	Mar-Jun	High-----	Moderate	High.
991*:										
Cisne------------	D	None--------	---	---	0-2.0	Perched	Feb-Jun	High-----	High-----	Moderate.
Huey-------------	D	None--------	---	---	+.5-2.0	Perched	Mar-Jun	High-----	High-----	Low.
1108-------------- Bonnie	D	Frequent----	Long------	Jan-Jun	+.5-1.0	Apparent	Jan-Jun	High-----	High-----	High.
5002-------------- Cisne	D	None--------	---	---	+6-2.0	Perched	Feb-Jul	High-----	High-----	Moderate.
5912*:										
Hoyleton---------	D	None--------	---	---	+6-3.0	Apparent	Feb-Jul	High-----	High-----	High.
Darmstadt--------	D	None--------	---	---	+6-3.0	Perched	Feb-Jul	High-----	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; and UN, Unified)

Soil name and location	Sample number	Horizon designation	Depth	Moisture density: MAX	Moisture density: OPT	Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	LL	PI	Classification: AASHTO	Classification: UN
			In	Lb/ft3	Pct					Pct			
Blair silty clay loam:	S80IL-145-												
510 feet south and	28-1	Ap	0-4	105	19	---	100	99	97	32	10	A-4(10)	CL
2,450 feet east of	28-3	Bt2	8-12	101	22	---	---	100	98	43	21	A-7-6 (23)	CL
the center of sec.													
20, T. 4 S.,	28-6	2Btg3	27-35	111	18	---	100	99	93	33	15	A-6(13)	CL
R. 3 W.	28-8 and 9	2Btg5	40-54	113	16	---	100	98	89	33	19	A-6(16)	CL
Bluford silt loam:	S79IL-145-												
2,340 feet north	17-1	Ap	0-6	100	19	100	97	93	91	26	5	A-4(1)	CL-ML
and 198 feet west	17-5 and 6	Bt1	16-26	103	22	100	99	99	98	41	23	A-7-6 (23)	CL
of the center of													
sec. 2, T. 4 S.,	17-9	BCg	41-60	108	18	---	---	100	98	31	11	A-6(11)	CL
R. 3 W.													
Darmstadt silt loam:	S79IL-145-												
440 feet north and	7-1	Ap	0-8	101	19	100	99	99	96	34	8	A-4(7)	ML
1,250 feet east	7-5	Bt1	18-23	95	23	100	99	98	96	46	24	A-7-6 (23)	CL
of the center of													
sec. 15, T. 6 S.,	7-7 and 8	Btgn1	29-35	103	20	100	99	98	96	46	28	A-7-6 (29)	CL
R. 4 W.													
Hoyleton silt loam:	S79IL-145-												
660 feet south and	12-1	Ap	0-8	105	17	---	100	97	95	27	3	A-4(2)	ML
1,520 feet east	12-5	Bt2	24-32	93	25	---	---	100	98	44	29	A-7-6 (24)	CL
of the center of													
sec. 27, T. 6 S.,	12-8	C	50-70	117	16	---	100	99	95	29	22	A-4(8)	CL
R. 2 W.													
Karnak silty clay:	S80IL-145-												
1,600 feet north	4-1	Ap	0-3	95	24	---	100	99	96	43	20	A-7-6 (22)	CL
and 1,000 feet west													
of the center of	4-3	Bg2	9-23	96	22	---	100	99	94	54	33	A-7-6 (34)	CH
sec. 30, T. 6 S.,													
R. 2 W.	4-5	Cg	36-60	92	27	---	---	100	98	58	35	A-7-6 (39)	CH
Oconee silt loam:	S79IL-145-												
93 feet south and	20-5	Bt2	23-28	91	26	---	100	99	98	53	29	A-7-6 (32)	CH
2,000 feet west of													
the center of sec.	20-9	Cg	53-69	109	17	---	100	99	94	32	15	A-6(14)	CL
19, T. 4 S.,													
R. 4 W.													
Okaw silt loam:	S80IL-145-												
1,240 feet north	15-1	Ap	0-7	109	17	100	98	96	94	30	8	A-4(7)	CL
and 140 feet west	15-4	2Btg2	17-28	93	27	---	---	100	98	56	36	A-7-6 (39)	CH
of the southeast													
corner of sec. 25,	15-7	2Cg	53-66	96	25	---	---	100	99	61	40	A-7-6 (46)	CH
T. 6 S., R. 3 W.													

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

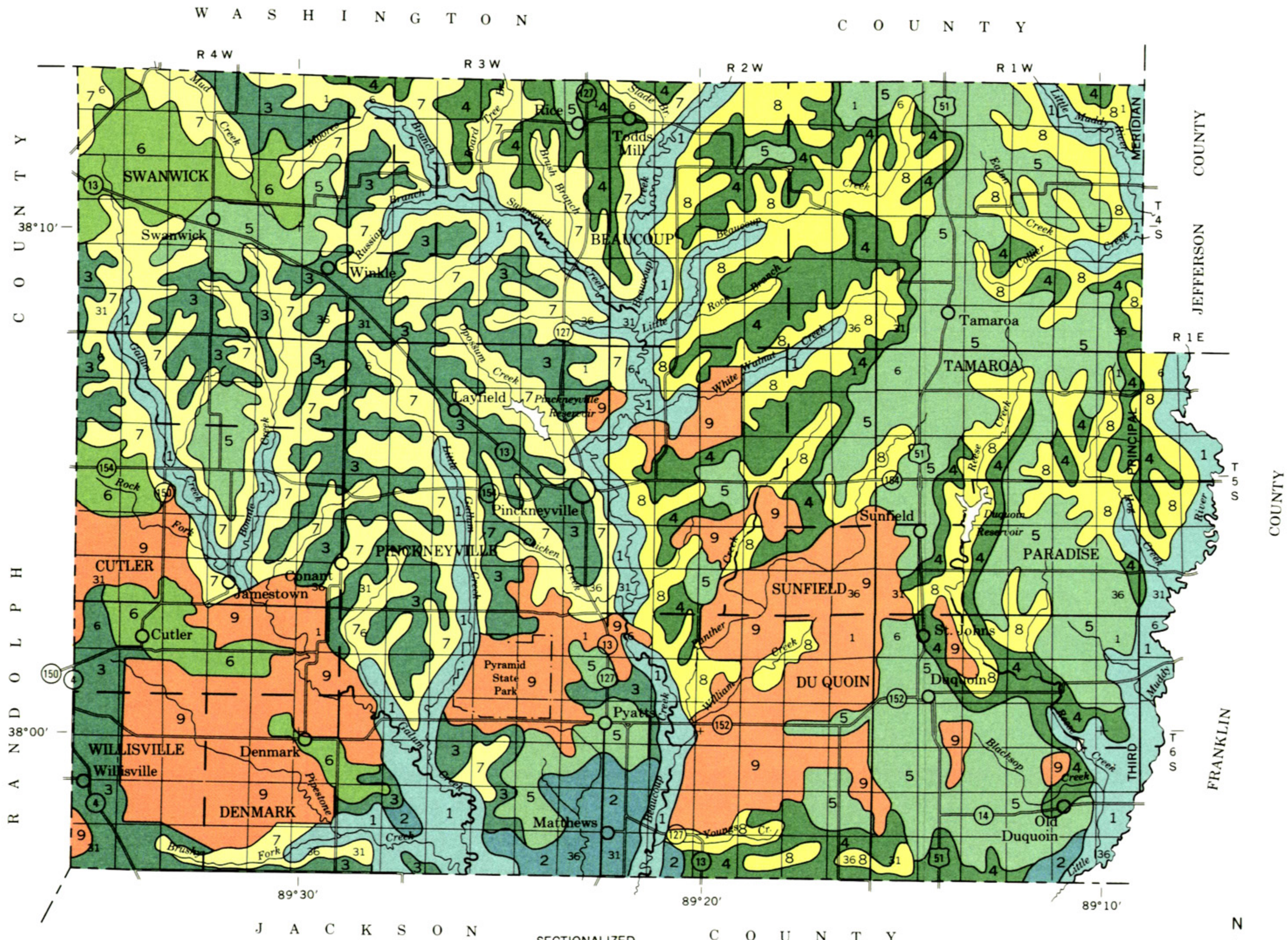
Soil name	Family or higher taxonomic class
Atlas	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
*Ava	Fine-silty, mixed, mesic Typic Fragiudalfs
Banlic	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Belknap	Coarse-silty, mixed, acid, mesic Aeric Fluvaquents
Blair	Fine-silty, mixed, mesic Aquic Hapludalfs
Bluford	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Cisne	Fine, montmorillonitic, mesic Mollic Albaqualfs
Colp	Fine, montmorillonitic, mesic Aquic Hapludalfs
Darmstadt	Fine-silty, mixed, mesic Albic Natraqualfs
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
*Hosmer	Fine-silty, mixed, mesic Typic Fragiudalfs
Hoyleton	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Huey	Fine-silty, mixed, mesic Typic Natraqualfs
Hurst	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Karnak	Fine, montmorillonitic, nonacid, mesic Vertic Haplaquepts
Lenzburg	Fine-loamy, mixed (calcareous), mesic Typic Udorthents
Morristown	Loamy-skeletal, mixed (calcareous), mesic Typic Udorthents
Oconee	Fine, montmorillonitic, mesic Udollic Ochraqualfs
Okaw	Fine, montmorillonitic, mesic Typic Albaqualfs
Orthents	Mixed, mesic Typic Udorthents
Richview	Fine-silty, mixed, mesic Mollic Hapludalfs
Schuline	Fine-loamy, mixed (calcareous), mesic Typic Udorthents
Stoy	Fine-silty, mixed, mesic Aquic Hapludalfs
Swanwick	Fine-silty, mixed, nonacid, mesic Typic Udorthents
Tamalco	Fine, montmorillonitic, mesic Typic Natrudalfs
Wagner	Fine, montmorillonitic, mesic Mollic Albaqualfs
Weir	Fine, montmorillonitic, mesic Typic Ochraqualfs
*Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Wynoose	Fine, montmorillonitic, mesic Typic Albaqualfs

☆U.S. GOVERNMENT PRINTING OFFICE : 1988 O - 183-552

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND

NEARLY LEVEL AND GENTLY SLOPING, POORLY DRAINED TO MODERATELY WELL DRAINED SOILS THAT ARE SUBJECT TO FLOODING; ON FLOOD PLAINS AND TERRACES

1 — Bonnie-Belknap association: Nearly level, poorly drained and somewhat poorly drained soils formed in silty alluvium; on flood plains

2 — Hurst-Okaw-Colp association: Nearly level and gently sloping, moderately well drained to poorly drained soils formed in loess and in the underlying clayey or silty lacustrine sediments; on terraces

NEARLY LEVEL TO SLOPING, MODERATELY WELL DRAINED TO POORLY DRAINED SOILS; ON UPLANDS

3 — Stoy-Hosmer association: Nearly level to sloping, somewhat poorly drained and moderately well drained soils formed in loess; on uplands

4 — Bluford-Wynoose-Ava association: Nearly level to sloping, moderately well drained to poorly drained soils formed in loess and in the underlying silty sediments; on uplands

5 — Hoyleton-Cisne association: Nearly level and gently sloping, somewhat poorly drained and poorly drained soils formed in loess and in the underlying silty sediments; on uplands

6 — Oconee-Cisne-Darmstadt association: Nearly level and gently sloping, somewhat poorly drained and poorly drained soils formed in loess or in loess and the underlying silty sediments; on uplands

SLOPING TO STEEP, WELL DRAINED TO SOMEWHAT POORLY DRAINED SOILS; ON UPLANDS

7 — Hosmer-Hickory-Blair association: Sloping to steep, well drained to somewhat poorly drained soils formed in loess, glacial till, and silty sediments; on uplands

8 — Ava-Hickory-Blair association: Sloping to steep, well drained to somewhat poorly drained soils formed in loess, silty sediments, and glacial till; on uplands

ORTHENTS AND GENTLY SLOPING TO STEEP, WELL DRAINED SOILS; ON UPLANDS

9 — Lenzburg-Orthents-Morristown association: Orthents and gently sloping to steep, well drained soils formed in cast overburden; in surfaced-mined areas

COMPILED 1986

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ILLINOIS AGRICULTURAL EXPERIMENT STATION

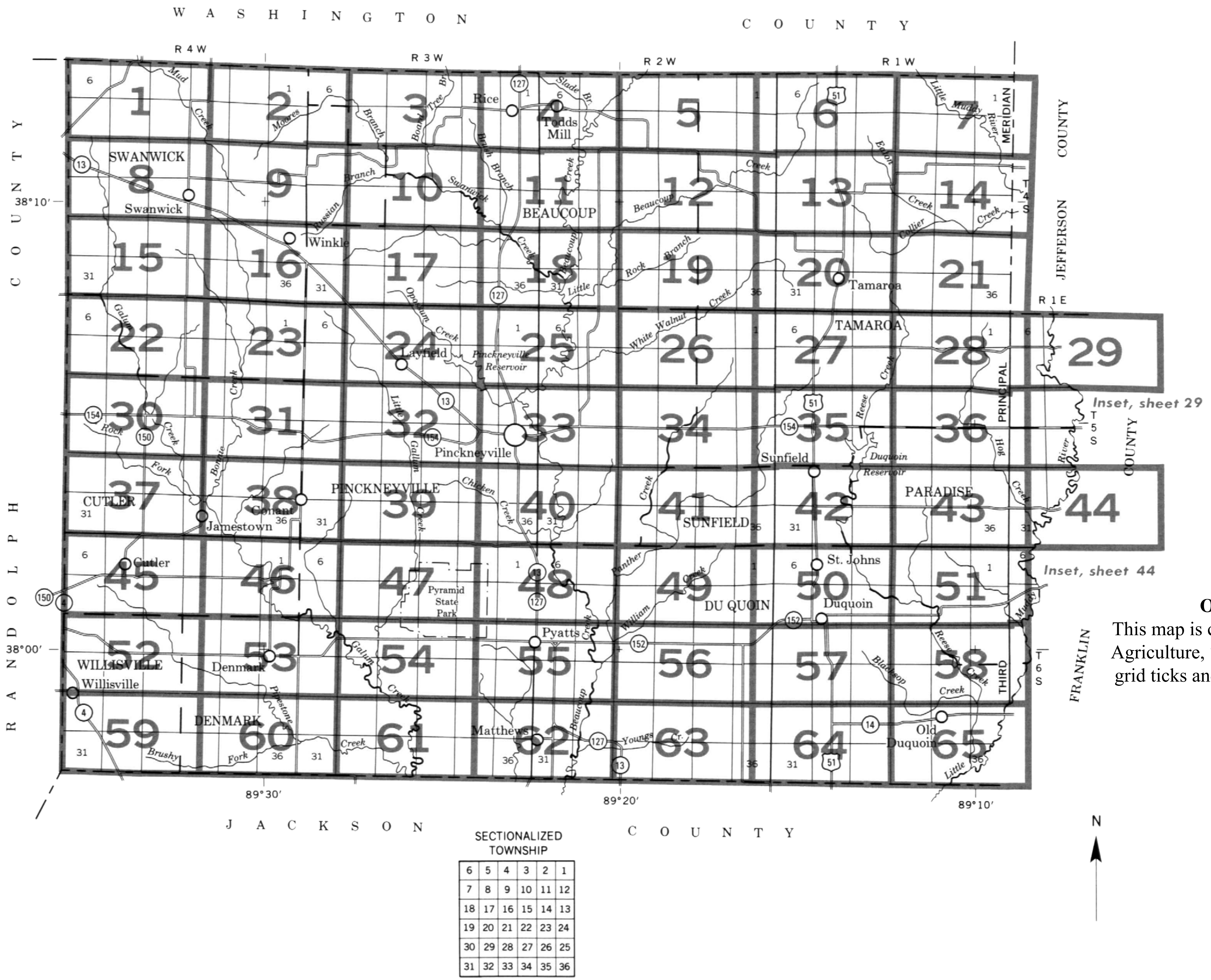
GENERAL SOIL MAP

PERRY COUNTY, ILLINOIS

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



Original text from each individual map sheet read:
This map is compiled on 1977 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

INDEX TO MAP SHEETS

PERRY COUNTY, ILLINOIS

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is eroded and 3 that it is severely eroded.

SYMBOL	NAME
2	Cisne silt loam
3A	Hoyleton silt loam, 0 to 2 percent slopes
3B	Hoyleton silt loam, 2 to 4 percent slopes
3B2	Hoyleton silt loam, 2 to 6 percent slopes, eroded
4B	Richview silt loam, 2 to 5 percent slopes
4C2	Richview silt loam, 5 to 10 percent slopes, eroded
5C3	Blair silty clay loam, 5 to 10 percent slopes, severely eroded
5D	Blair silt loam, 10 to 18 percent slopes
5D3	Blair silty clay loam, 10 to 18 percent slopes, severely eroded
7D3	Atlas silty clay loam, 10 to 18 percent slopes, severely eroded
8E	Hickory silt loam, 18 to 30 percent slopes
8E3	Hickory silty clay loam, 18 to 30 percent slopes, severely eroded
8G	Hickory silt loam, 30 to 60 percent slopes
12	Wynoose silt loam
13A	Bluford silt loam, 0 to 2 percent slopes
13B	Bluford silt loam, 2 to 4 percent slopes
13B2	Bluford silt loam, 2 to 6 percent slopes, eroded
14B	Ava silt loam, 2 to 5 percent slopes
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded
26	Wagner silt loam
84	Okaw silt loam
108	Bonnie silt loam
113	Oconee silt loam
122B2	Colp silt loam, 2 to 7 percent slopes, eroded
164A	Stoy silt loam, 0 to 2 percent slopes
164B	Stoy silt loam, 2 to 4 percent slopes
164B2	Stoy silt loam, 2 to 6 percent slopes, eroded
165	Weir silt loam
214B	Hosmer silt loam, 2 to 5 percent slopes
214C3	Hosmer silty clay loam, 5 to 10 percent slopes, severely eroded
338	Hurst silt loam
382	Belknap silt loam
426	Karnak silty clay
536	Dumps, mine
581B2	Tamalco silt loam, 1 to 5 percent slopes, eroded
787	Banlic silt loam
802B	Orthents, loamy, undulating
821G	Morristown cobbly silty clay loam, 20 to 60 percent slopes, very stony
823B	Shuline silt loam, 1 to 5 percent slopes
823C	Schuline silt loam, 5 to 10 percent slopes
823D	Schuline silt loam, 10 to 15 percent slopes
824B	Swanwick silt loam, 1 to 5 percent slopes
825C	Lenzburg silty clay loam, acid substratum, 2 to 12 percent slopes
850D3	Hickory-Hosmer silty clay loams, 10 to 18 percent slopes, severely eroded
866	Dumps, slurry
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony
871G	Lenzburg gravelly silty clay loam, 20 to 60 percent slopes, stony
900E	Hickory-Wellston silt loams, 18 to 30 percent slopes
900E3	Wellston-Hickory silty clay loams, 18 to 30 percent slopes, severely eroded
900G	Wellston-Hickory silt loams, 30 to 60 percent slopes
912A	Hoyleton-Darmstadt silt loams, 0 to 2 percent slopes
912B2	Darmstadt-Hoyleton silt loams, 2 to 6 percent slopes, eroded
916	Oconee-Darmstadt silt loams
929D3	Hickory-Ava silty clay loams, 10 to 18 percent slopes, severely eroded
991	Cisne-Huey silt loams
1108	Bonnie silt loam, wet
5002	Cisne silt loam, mine sinks
5912	Hoyleton-Darmstadt silt loams, mine sinks

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Reservation (national forest or park, state forest or park, and large airport)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery — Davis Airstrip

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections)

ROADS

- Divided (median shown if scale permits)
- Other roads

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 79
- Federal — 410
- State — 52

RAILROAD

LEVEES

- Without road

DAMS

- Large (to scale)
- Medium or small — water; w

MISCELLANEOUS CULTURAL FEATURES

- Church
- School

WATER FEATURES

DRAINAGE

- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 13A 14B

ESCARPMENTS

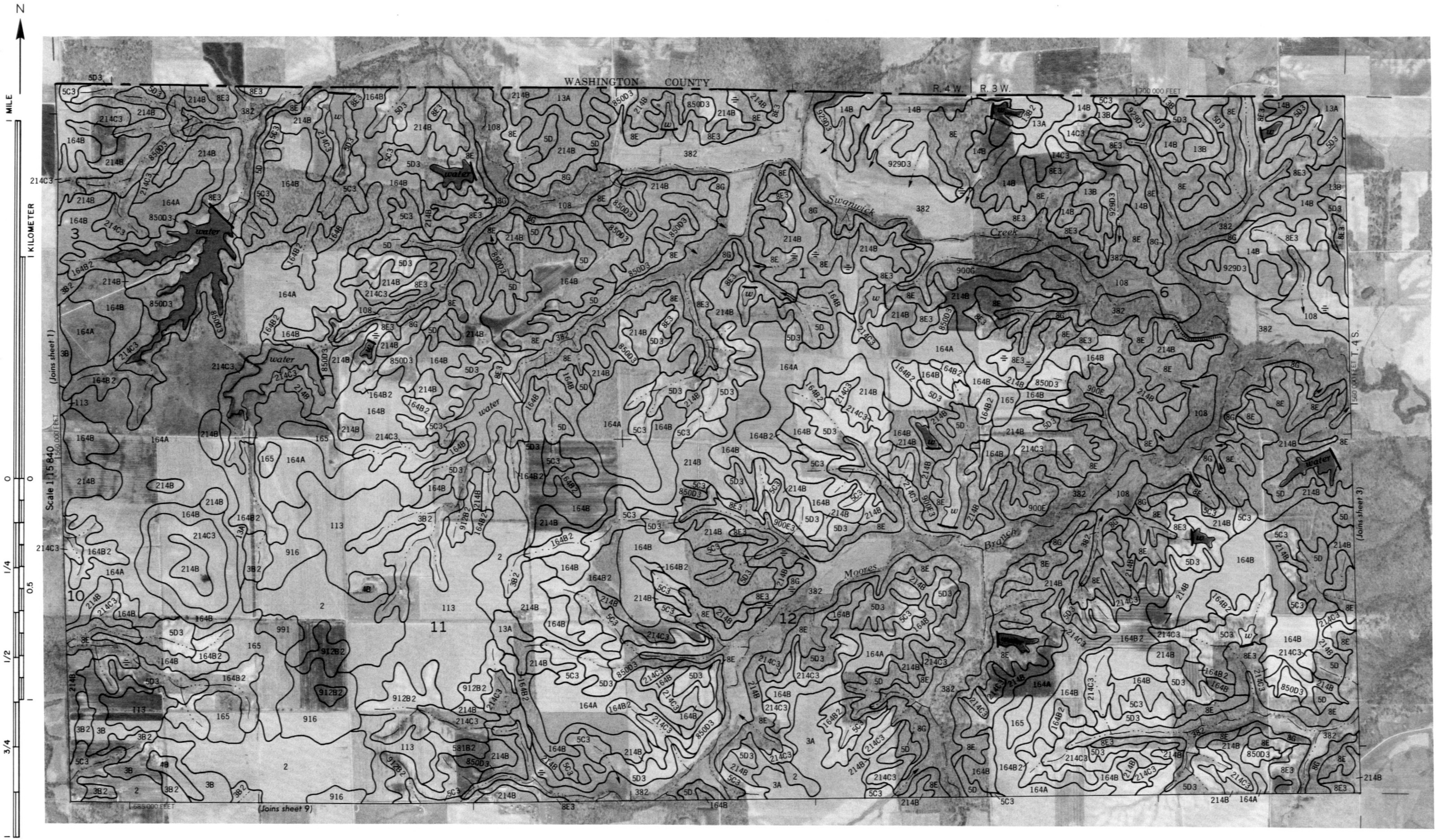
- Other than bedrock (points down slope)

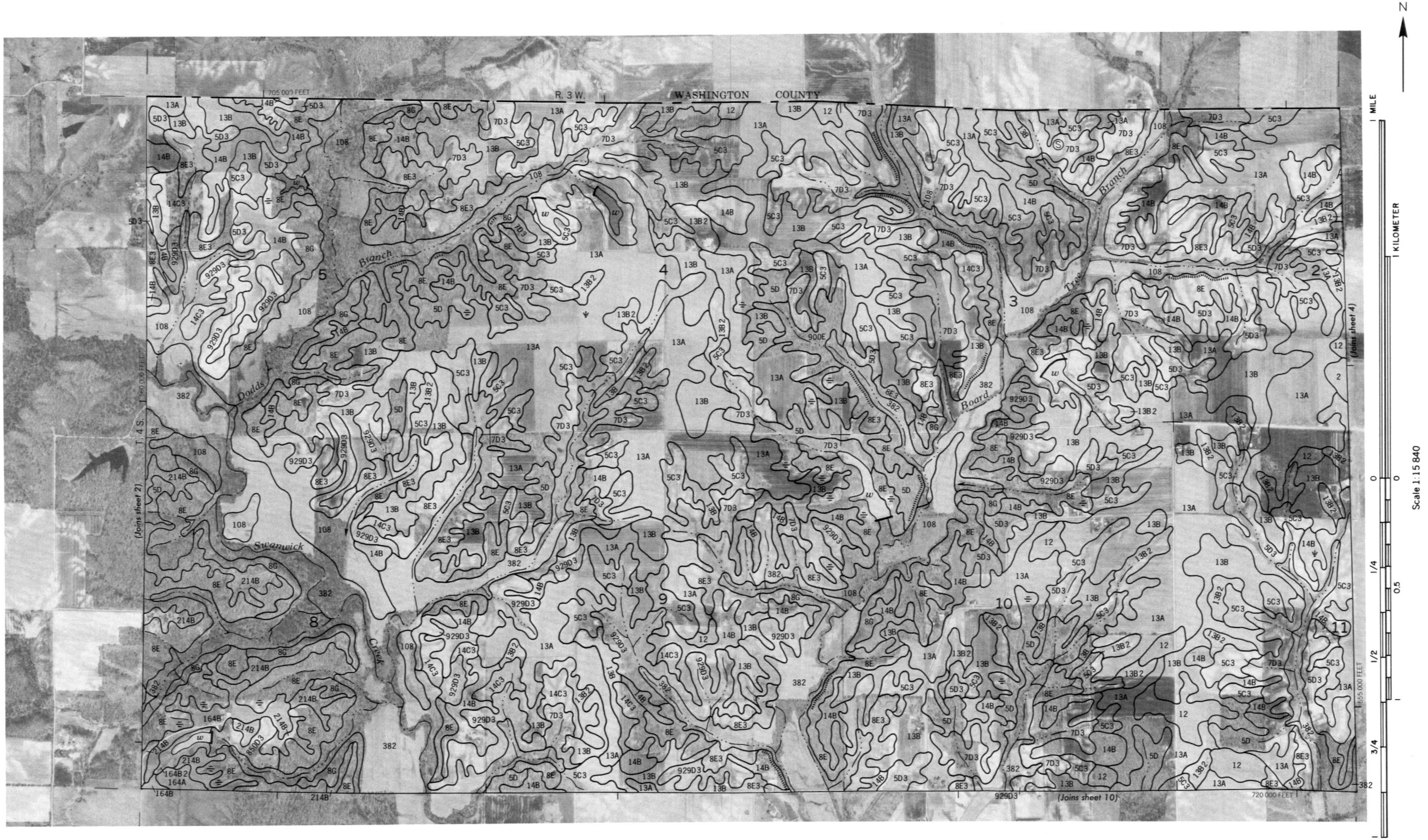
SOIL SAMPLE SITE — S

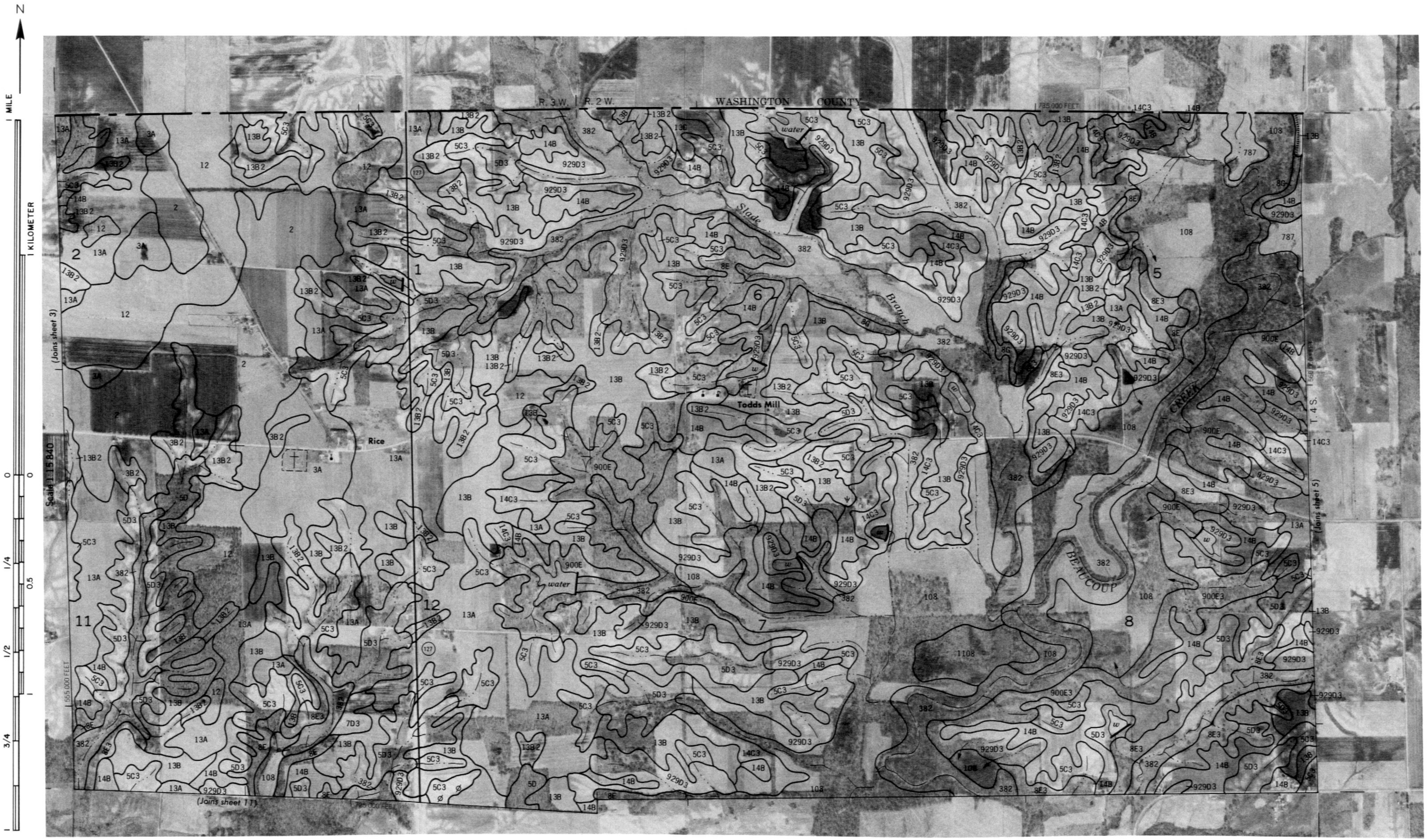
MISCELLANEOUS

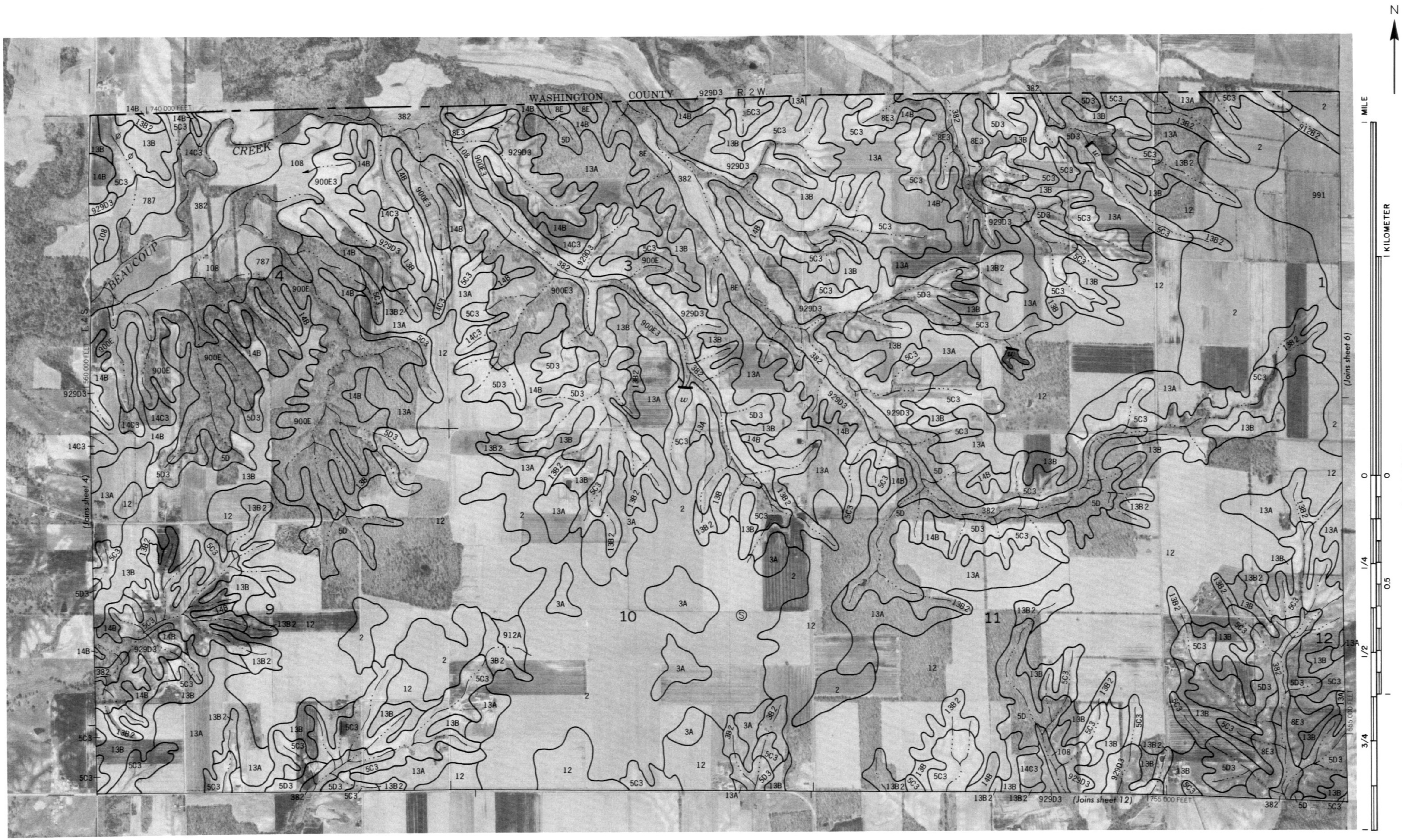
- Gumbo, slick or scabby spot (sodic)
- Rock outcrop (includes sandstone and shale)
- Severely eroded spot
- Mine sink

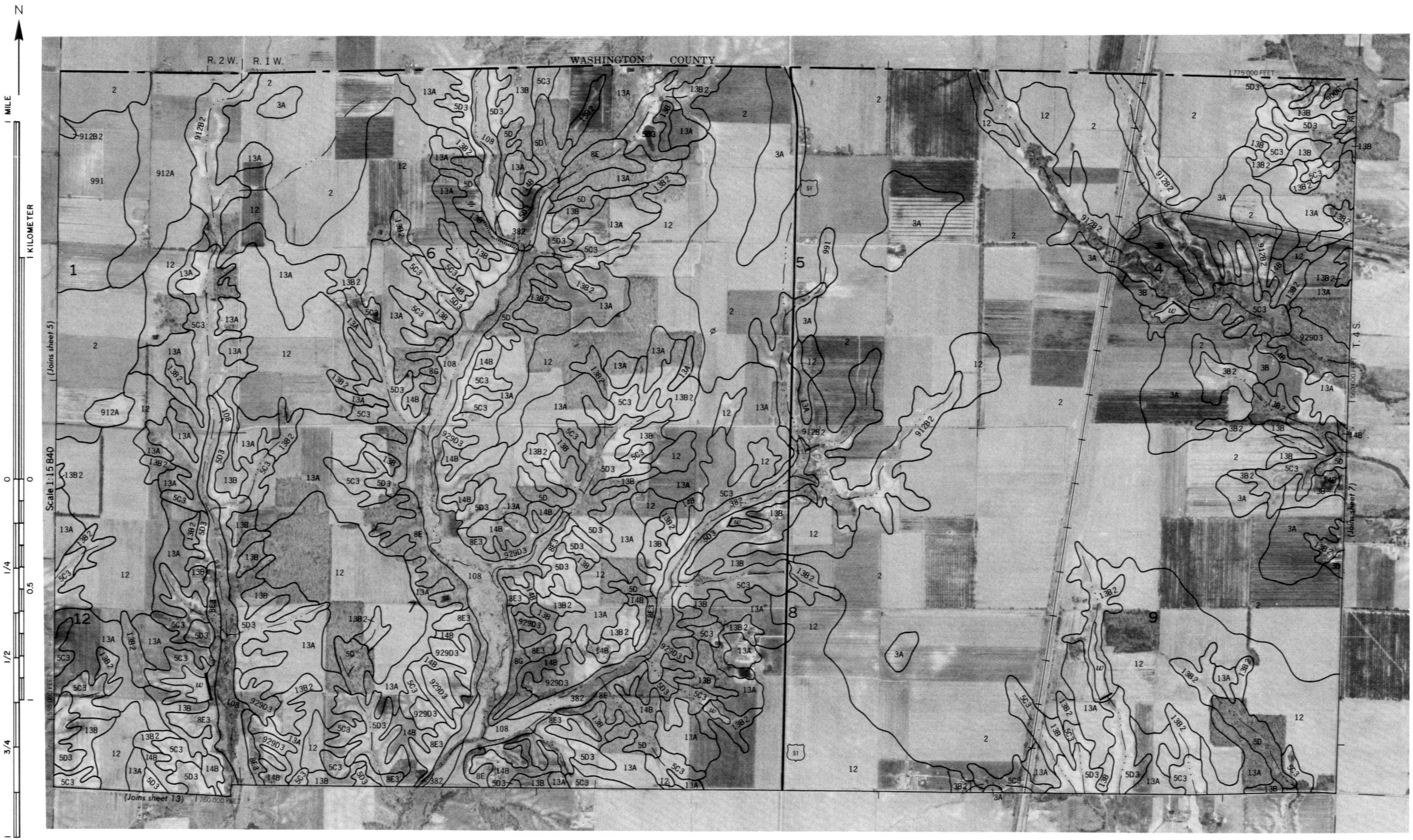

WASHINGTON COUNTY
R. 4 W.
RANDOLPH COUNTY
Mud
Creek
water
(Joins sheet 2)
(Joins sheet 8)
1 MILE
1 KILOMETER
Scale 1:15 840
N
1

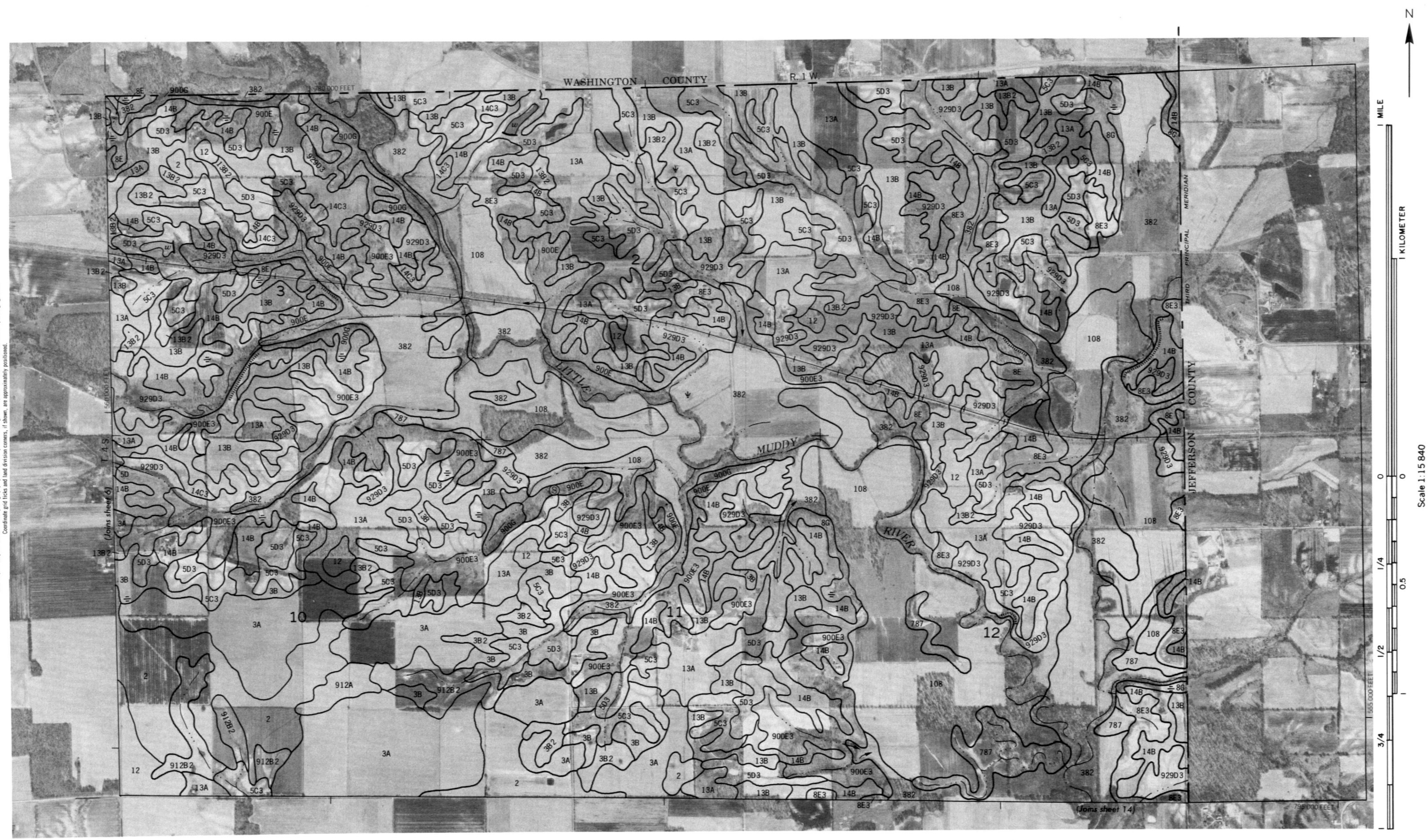

N
1 MILE
1 KILOMETER
Scale 1:15 840
WASHINGTON COUNTY
R. 4 W.
R. 3 W.
700 000 FEET
560 000 FEET
685 000 FEET
T. 4 S.
Swanwick
Creek
Moores
Branch
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 9)

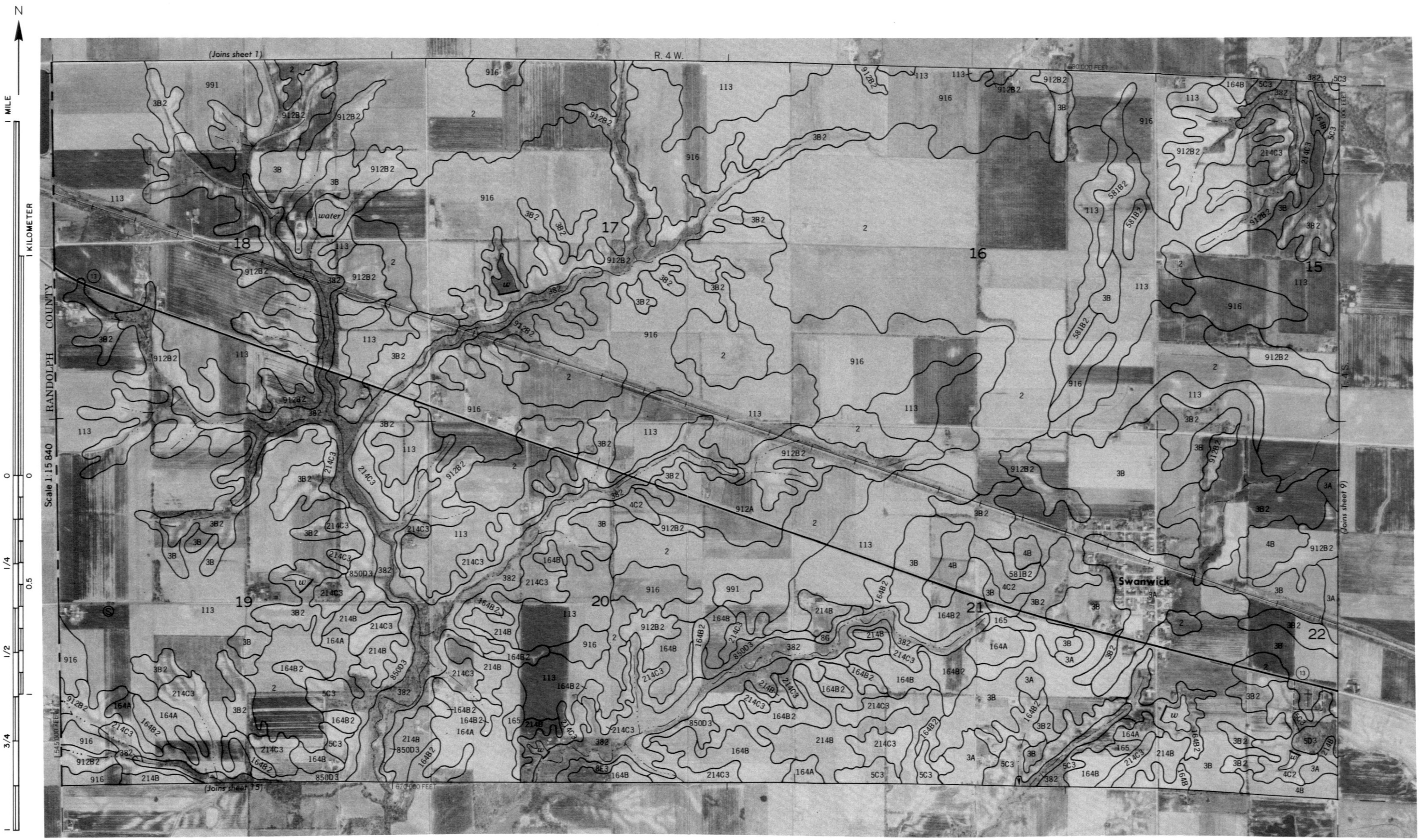

N
R. 3 W.
WASHINGTON COUNTY
705 000 FEET
T. 4 S.
560 000 FEET
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 10)
720 000 FEET
555 000 FEET
Dodds Branch
Swanwick Creek
Board Tree Branch
1 MILE
1 KILOMETER
Scale 1:15 840

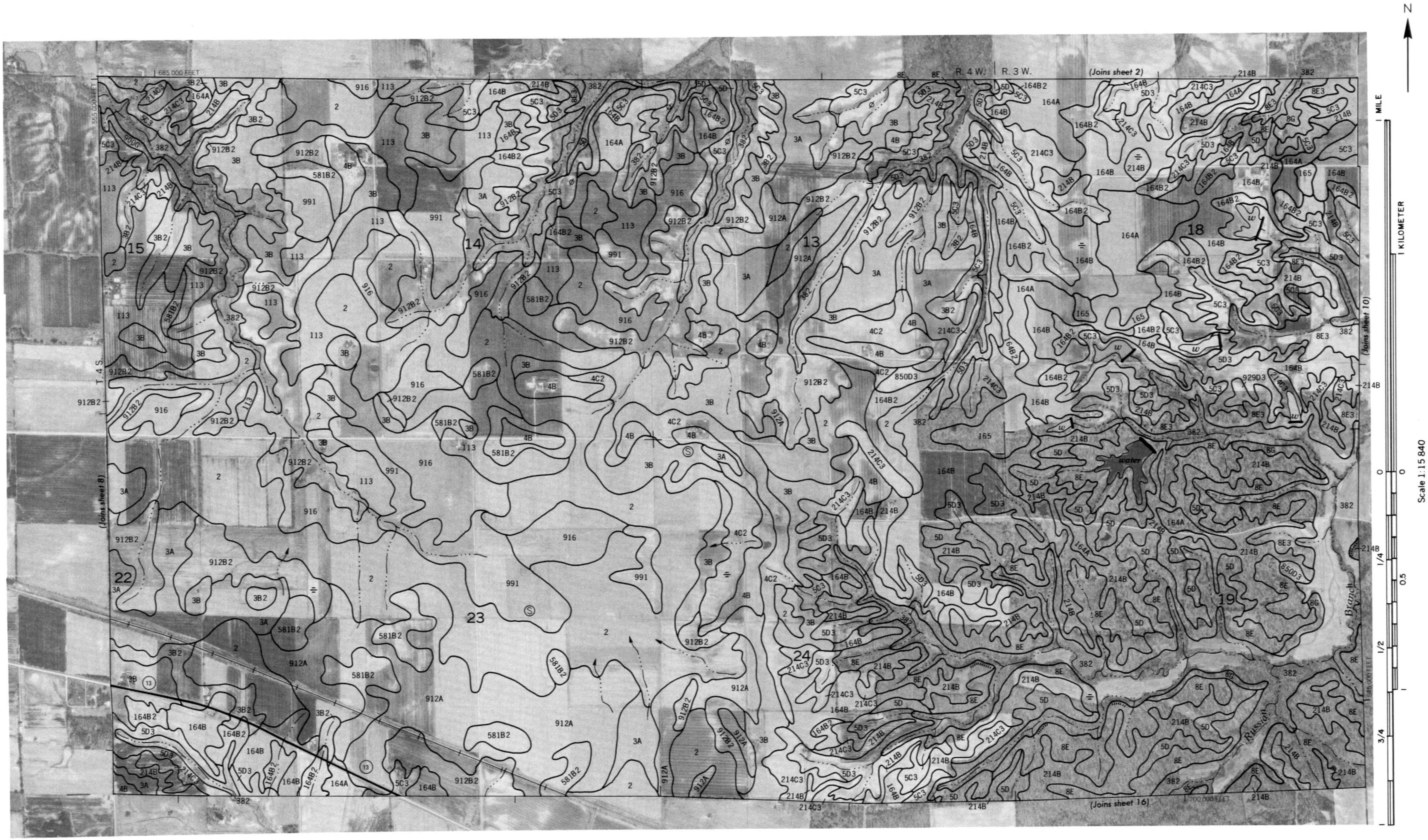

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0
0.5
1
R. 3 W.
R. 2 W.
WASHINGTON COUNTY
Slade Branch
Todds Mill
Rice
BEAUCOUP CREEK
T. 4 S.
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 11)
Scale 1:15 840


N
WASHINGTON COUNTY
R. 2 W.
740 000 FEET
CREEK
BEAUCOUP
T. 4 S.
560 000 FEET
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 12)
755 000 FEET
555 000 FEET
1
2
3
4
9
10
11
12
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840

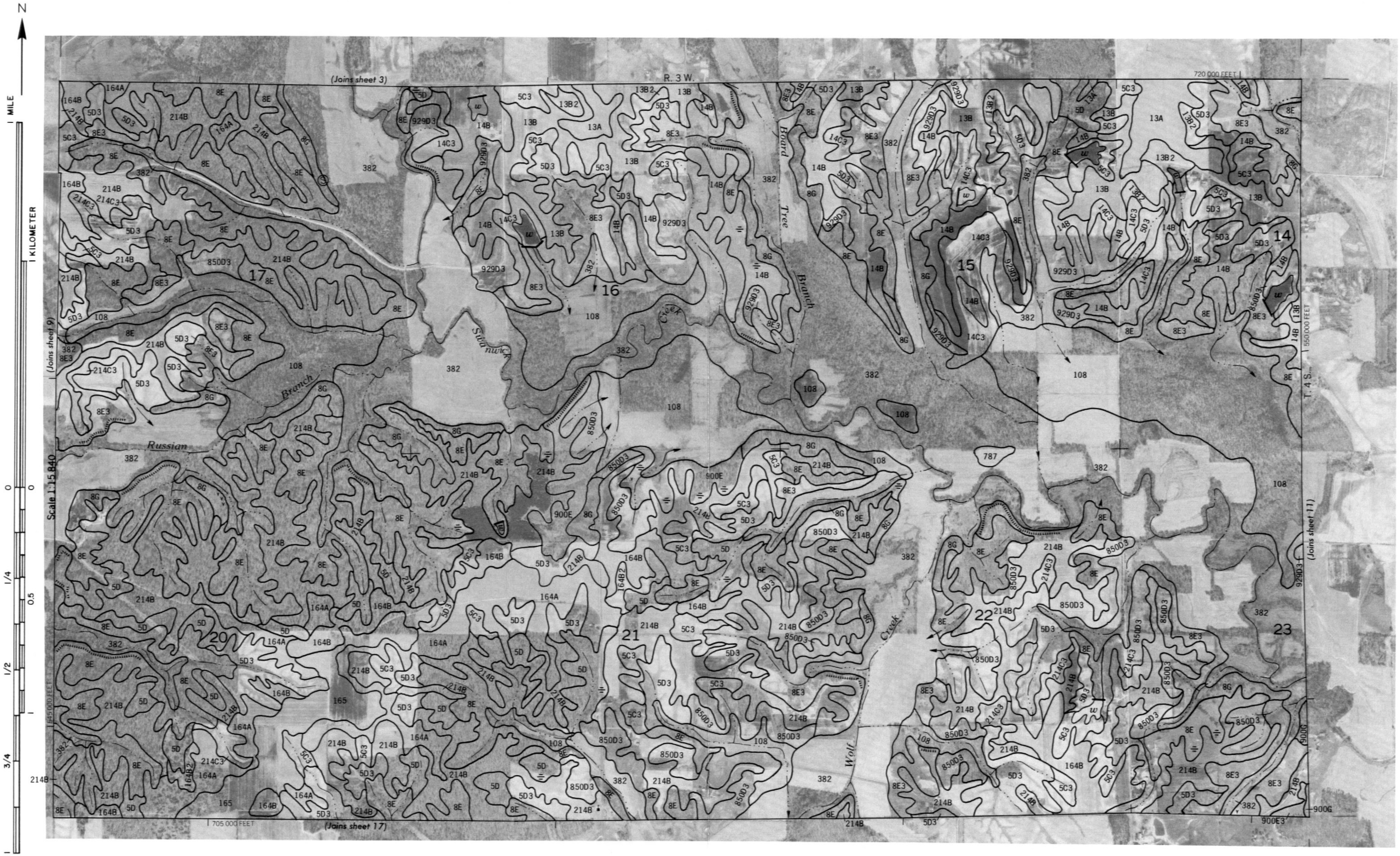

N
1 MILE
1 KILOMETER
Scale 1:15 840
R. 2 W.
R. 1 W.
WASHINGTON COUNTY
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 13)
T. 4 S.
775 000 FEET
760 000 FEET
51


N
WASHINGTON COUNTY
R. 1 W.
780 000 FEET
LITTLE
MUDDY
RIVER
JEFFERSON COUNTY
THIRD PRINCIPAL MERIDIAN
(Joins sheet 6)
(Joins sheet 14)
790 000 FEET
565 000 FEET
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

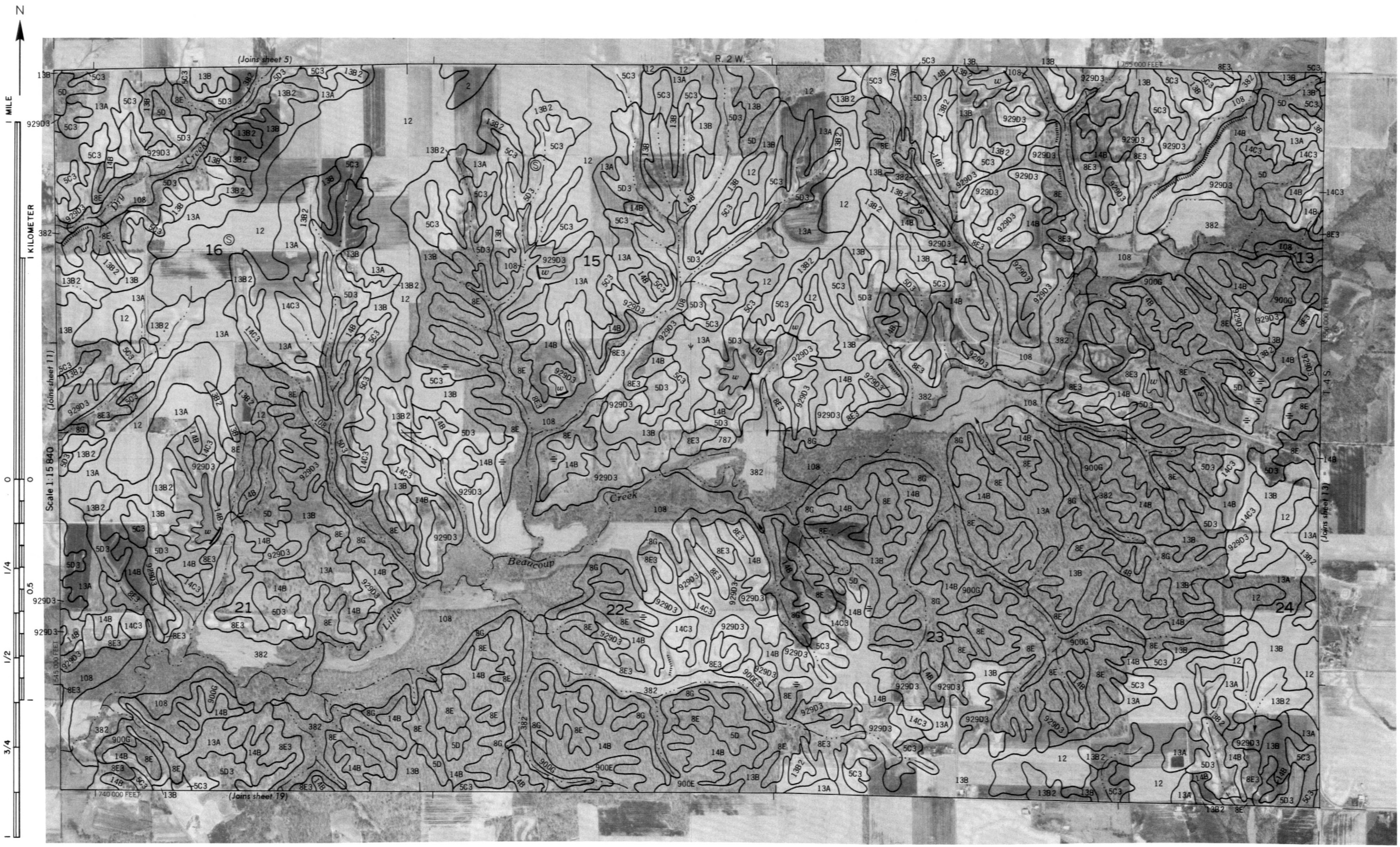

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
(Joins sheet 1)
R. 4 W.
680 000 FEET
RANDOLPH COUNTY
Scale 1:15 840
17
18
16
15
19
20
21
22
Swanwick
water
(Joins sheet 9)
(Joins sheet 15)
670 000 FEET

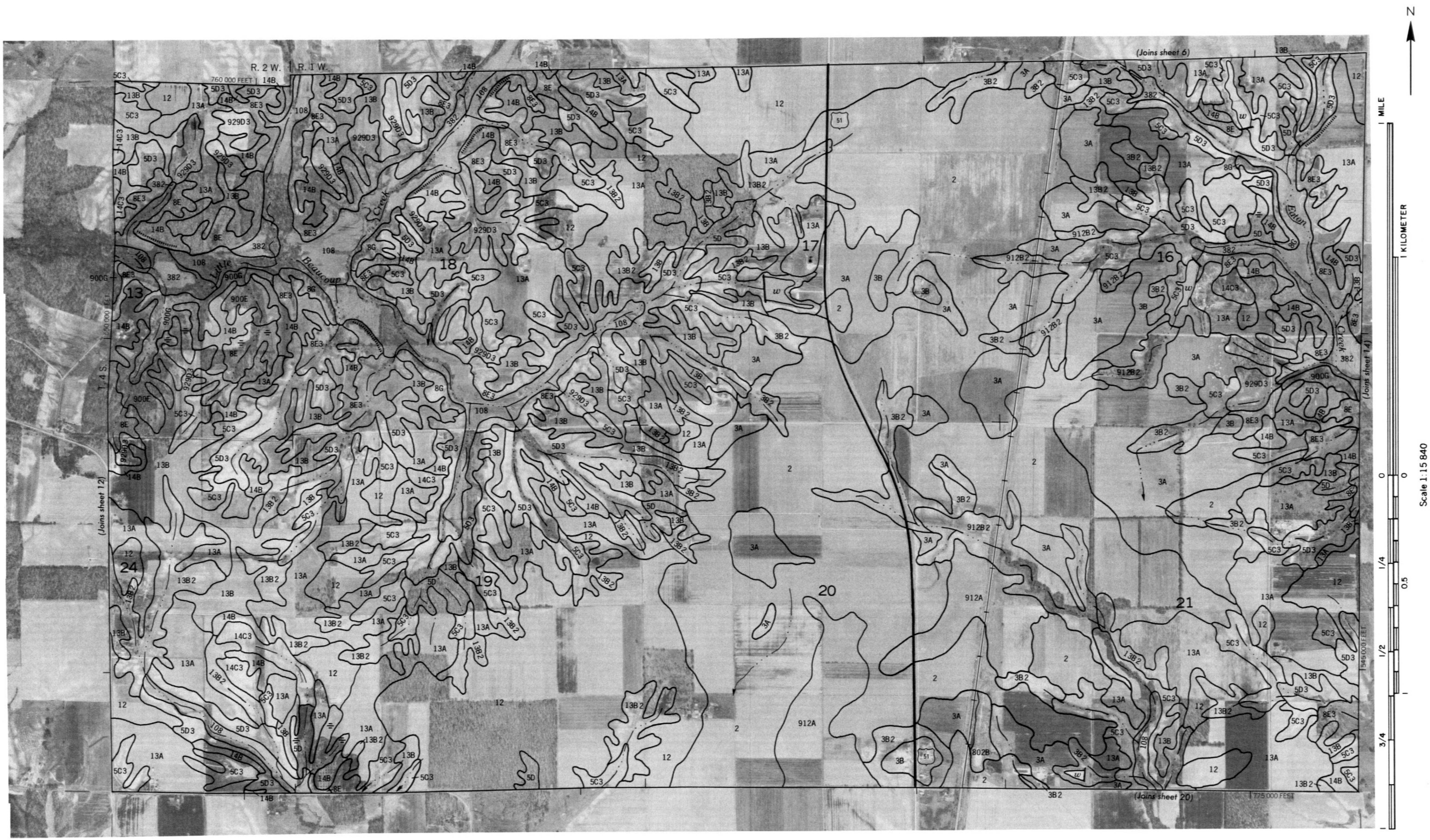

N
(Joins sheet 2)
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 16)
R. 4 W.
R. 3 W.
T. 4 S.
685 000 FEET
555 000 FEET
700 000 FEET
water
Russian
Branch
MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
13
14
15
18
19
22
23
24

PERRY COUNTY, ILLINOIS — SHEET NUMBER 10

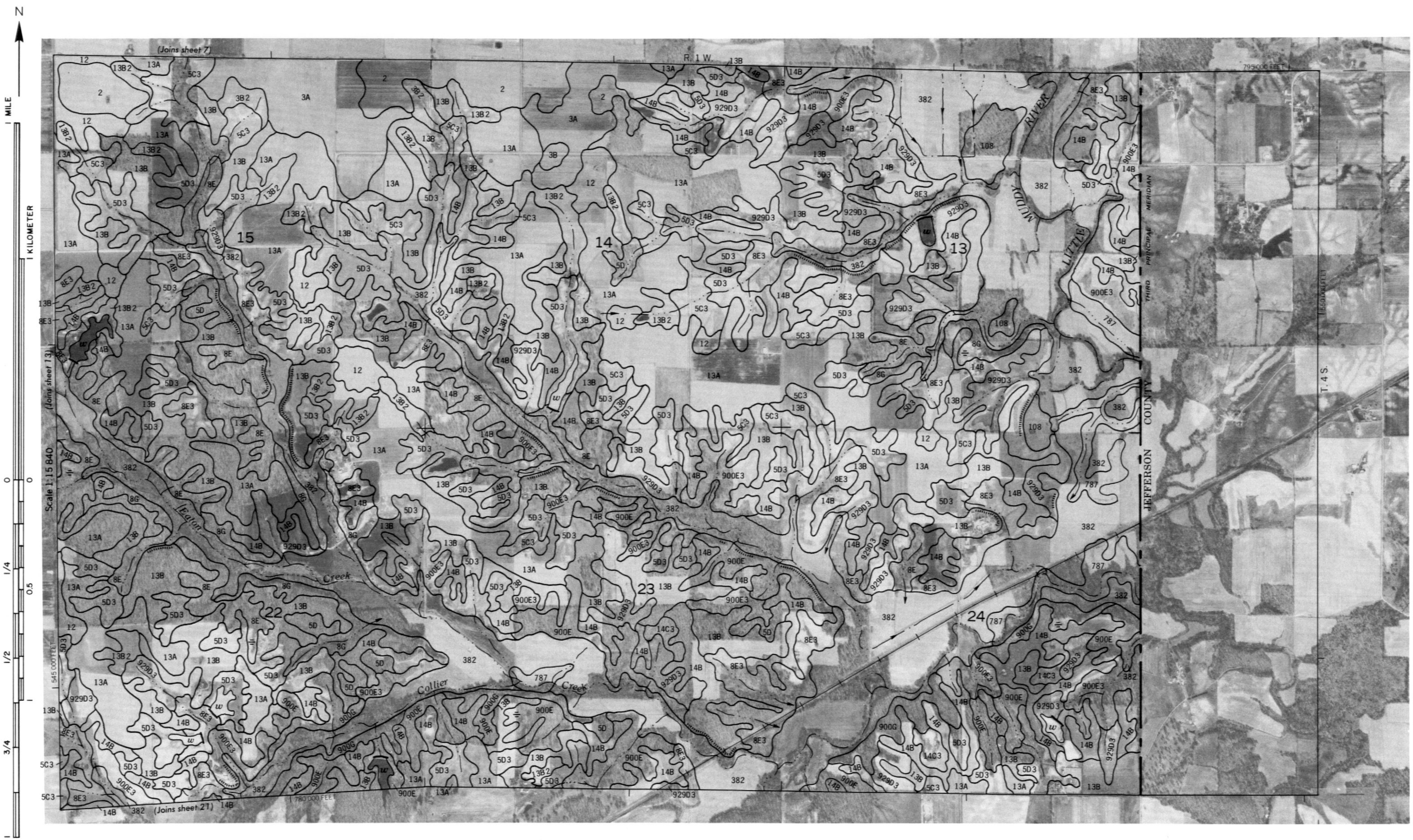


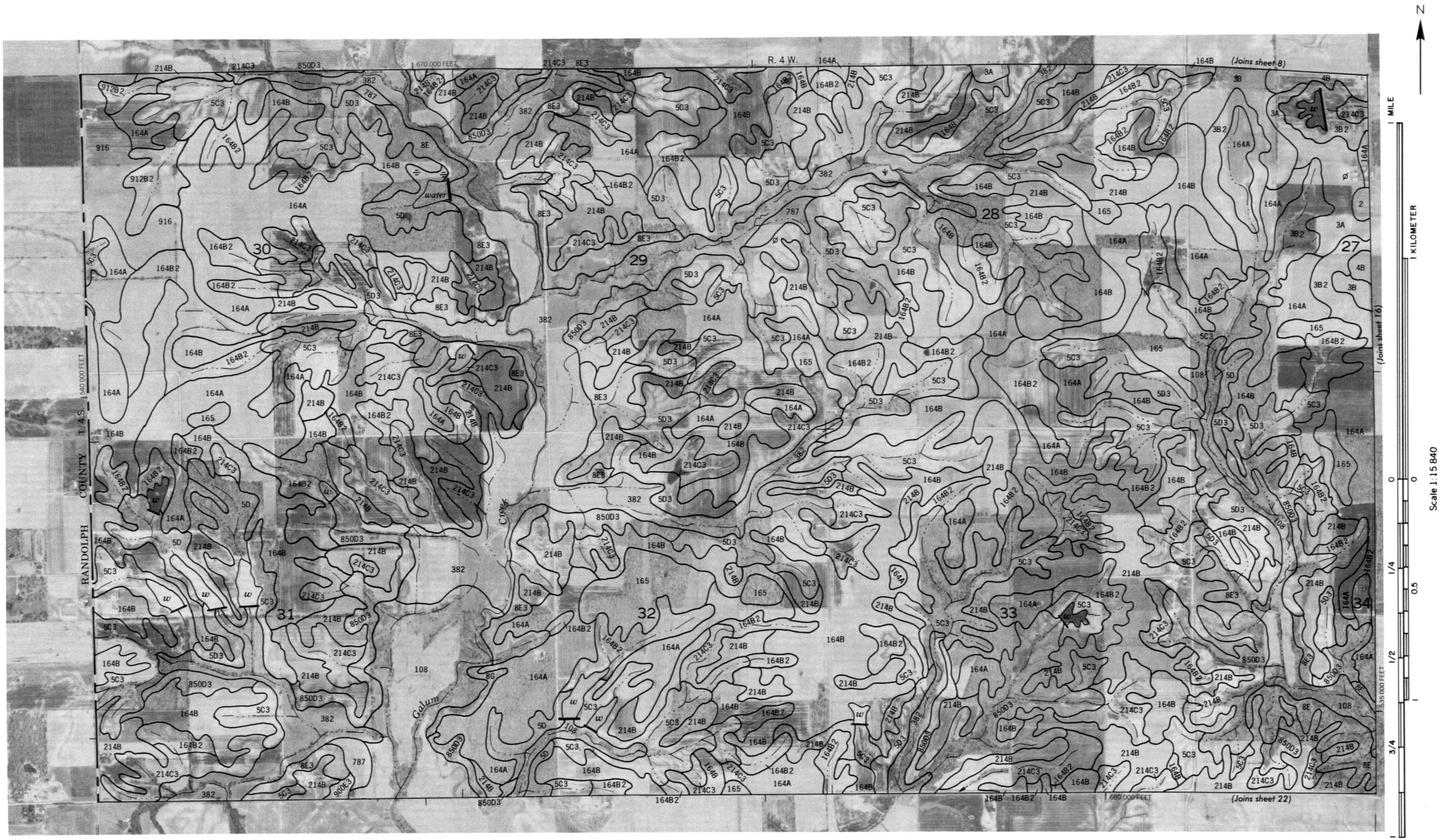

N
(Joins sheet 4)
(Joins sheet 12)
(Joins sheet 18)
(Joins sheet 10)
R. 3 W.
R. 2 W.
T. 4 S.
725 000 FEET
735 000 FEET
550 000 FEET
BEAUCOUP
CREEK
Dry Creek
Swanwick
Creek
Bush
Branch
water
1 MILE
3/4
1/2
1/4
0
1 KILOMETER
0.5
0
Scale 1:15 840

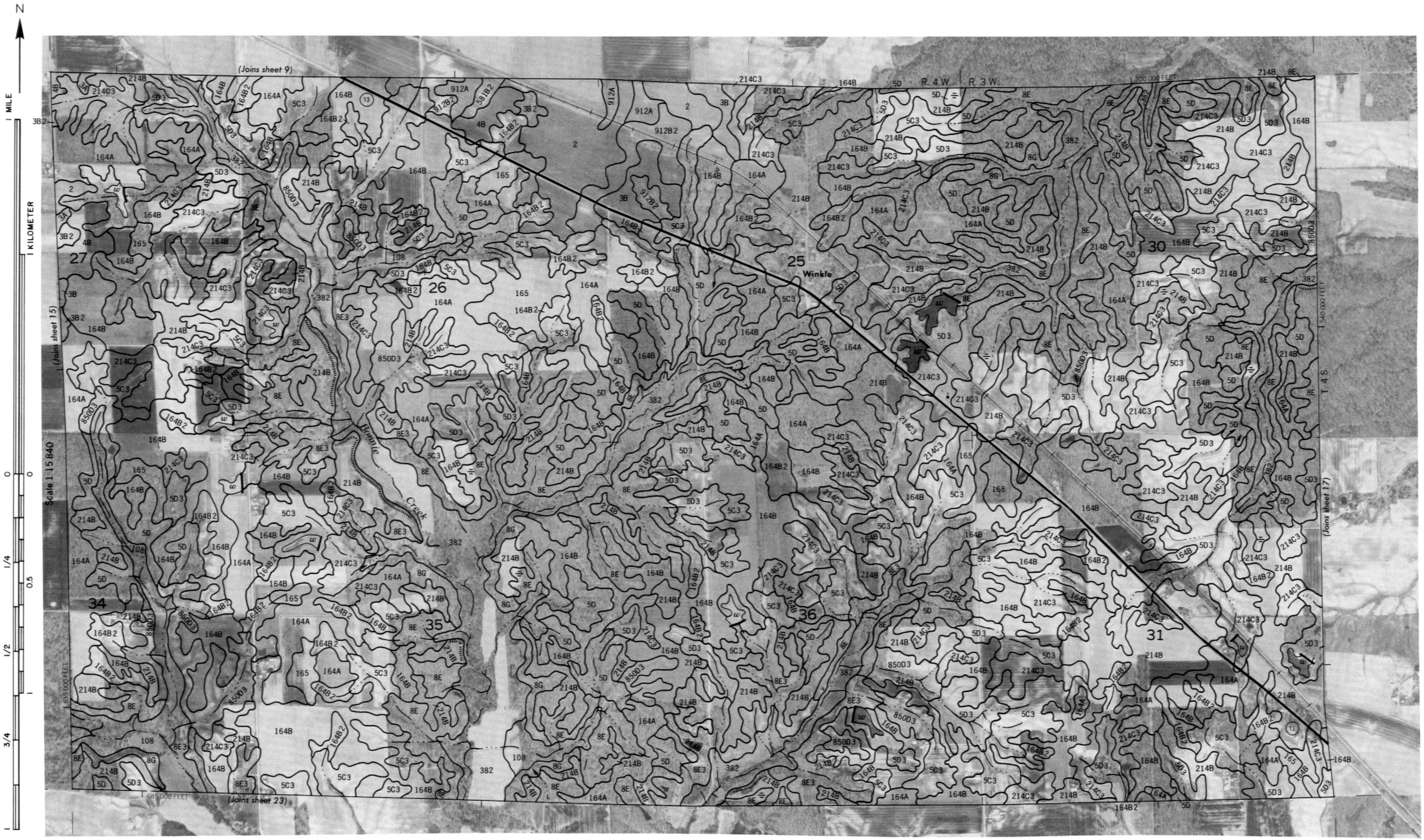

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 5)
R. 2 W.
755 000 FEET
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 19)
T. 4 S.
545 000 FEET
740 000 FEET
Dry Creek
Little Beaucoup Creek
16
15
14
13
21
22
23
24

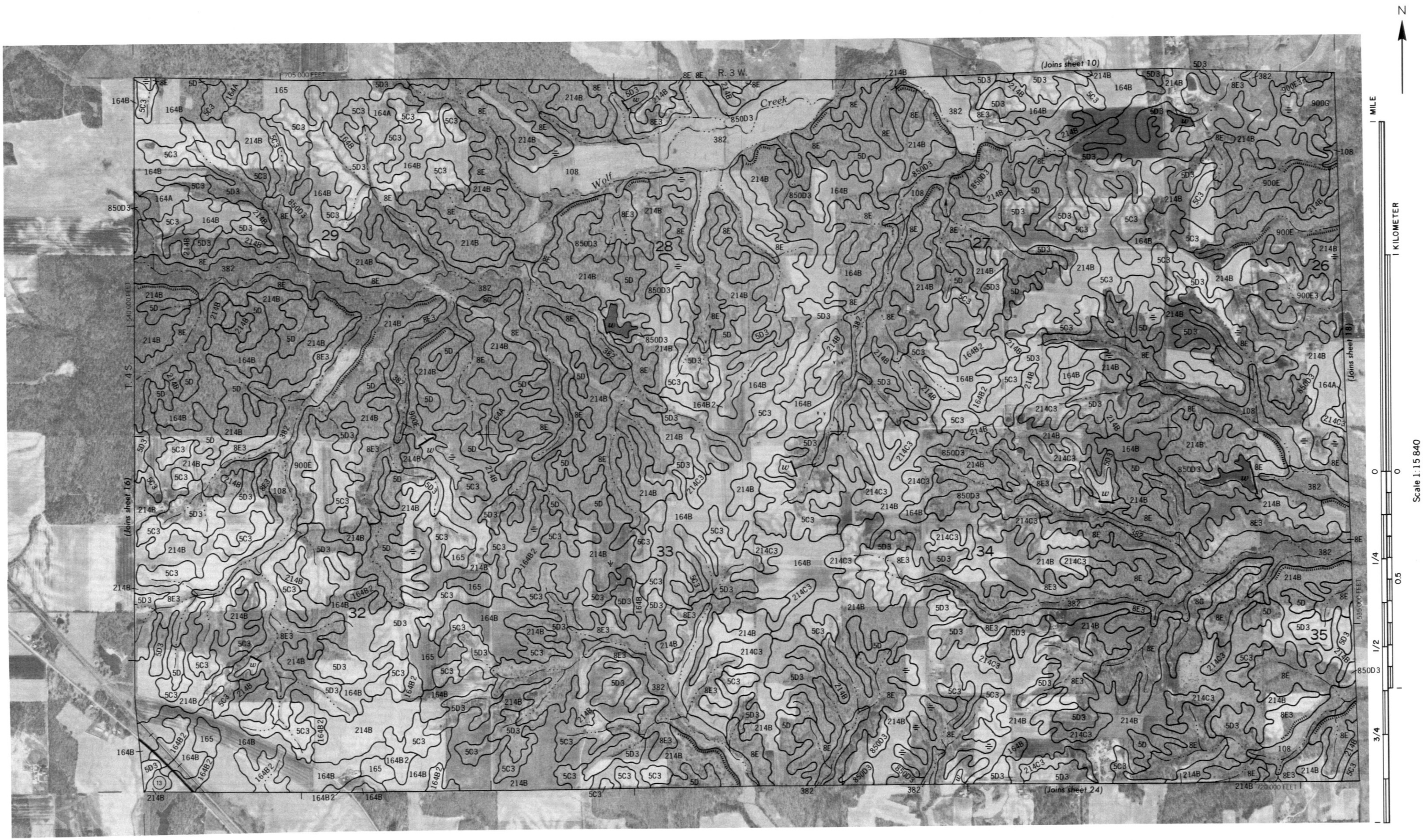

N
(Joins sheet 6)
(Joins sheet 20)
(Joins sheet 12)
(Joins sheet 14)
R. 2 W.
R. 1 W.
T. 4 S.
760 000 FEET
775 000 FEET
545 000 FEET
550 000 FEET
Little Beaucoup Creek
Eaton Creek
13
16
17
18
19
20
21
24
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

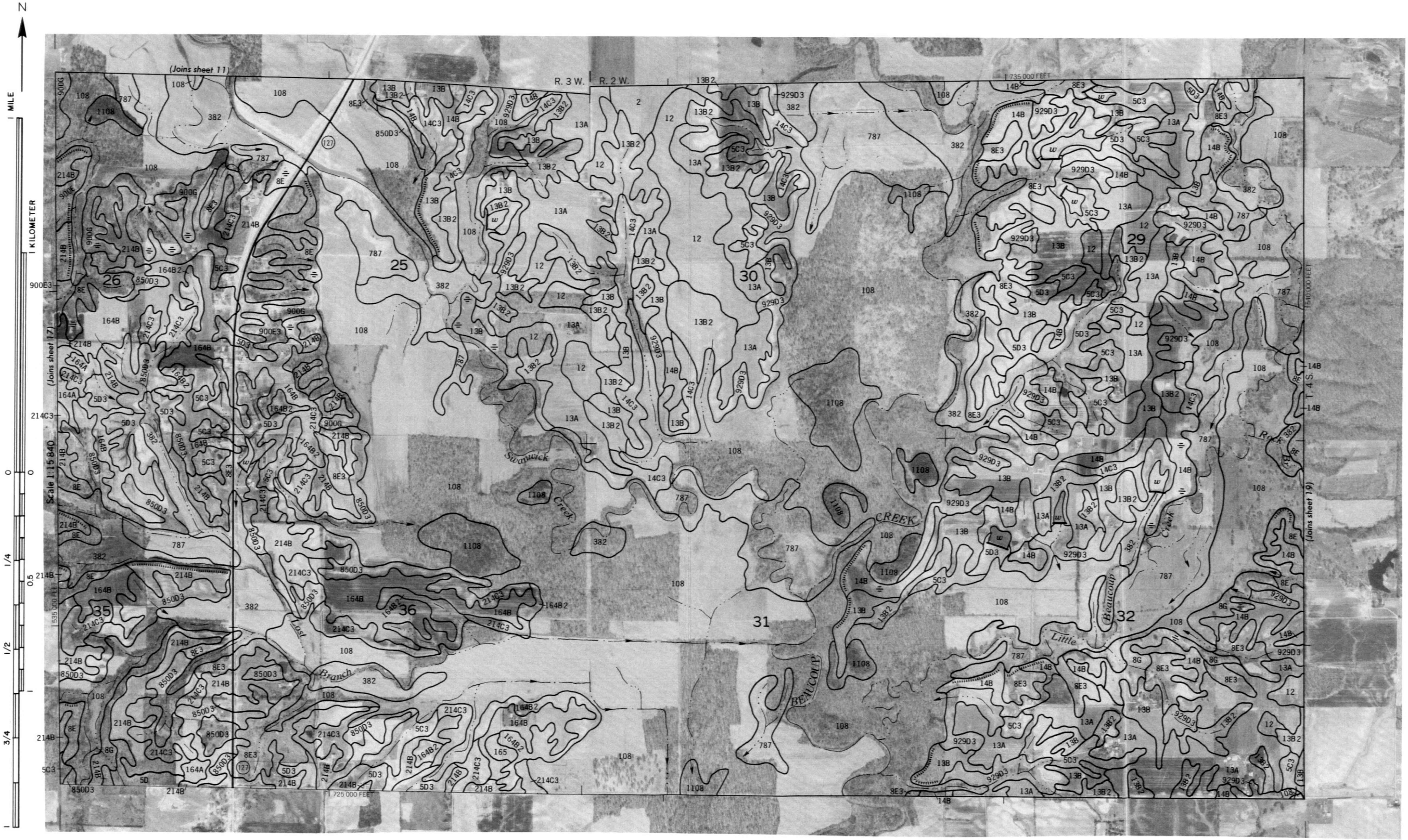
PERRY COUNTY, ILLINOIS — SHEET NUMBER 14

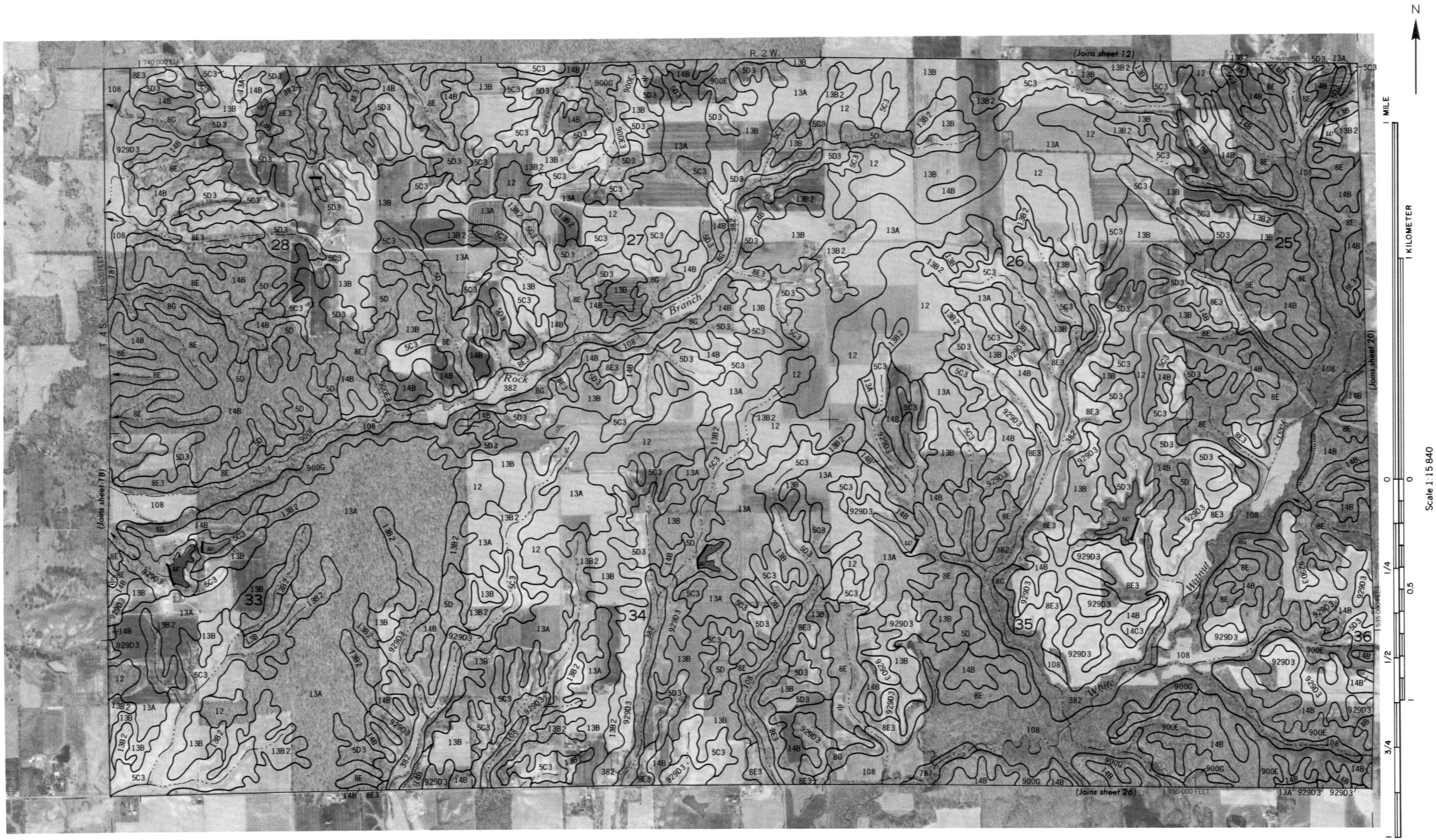



N
R. 4 W.
(Joins sheet 8)
(Joins sheet 16)
(Joins sheet 22)
670 000 FEET
680 000 FEET
540 000 FEET
535 000 FEET
T. 4 S.
RANDOLPH COUNTY
Galum Creek
30
29
28
27
31
32
33
34
MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5

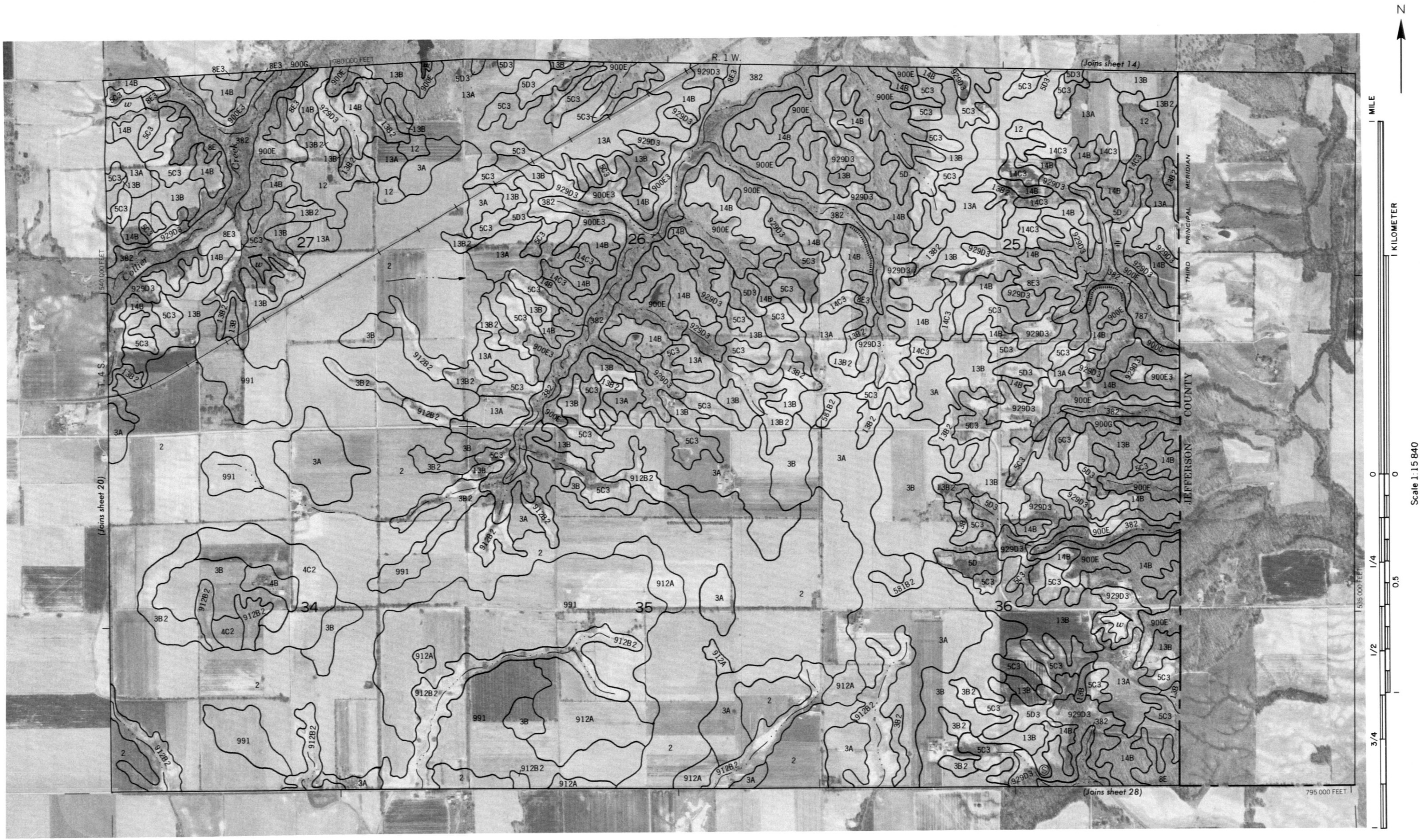

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 9)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 23)
R. 4 W.
R. 3 W.
T. 4 S.
700 000 FEET
540 000 FEET
535 000 FEET
685 000 FEET
Winkle
Bonnie
Creek
25
26
27
30
31
34
35
36
13


N
(Joins sheet 10)
R. 3 W.
T. 4 S.
Wolf Creek
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 24)
705 000 FEET
540 000 FEET
535 000 FEET
720 000 FEET
29
28
27
26
32
33
34
35
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 11)
(Joins sheet 17)
(Joins sheet 19)
R. 3 W.
R. 2 W.
T. 4 S.
735 000 FEET
725 000 FEET
540 000 FEET
535 000 FEET
Swanwick Creek
Lost Branch
BEAUCOUP CREEK
Little Beaucoup Creek
Rock Br.
25
26
29
30
31
32
35
36
127

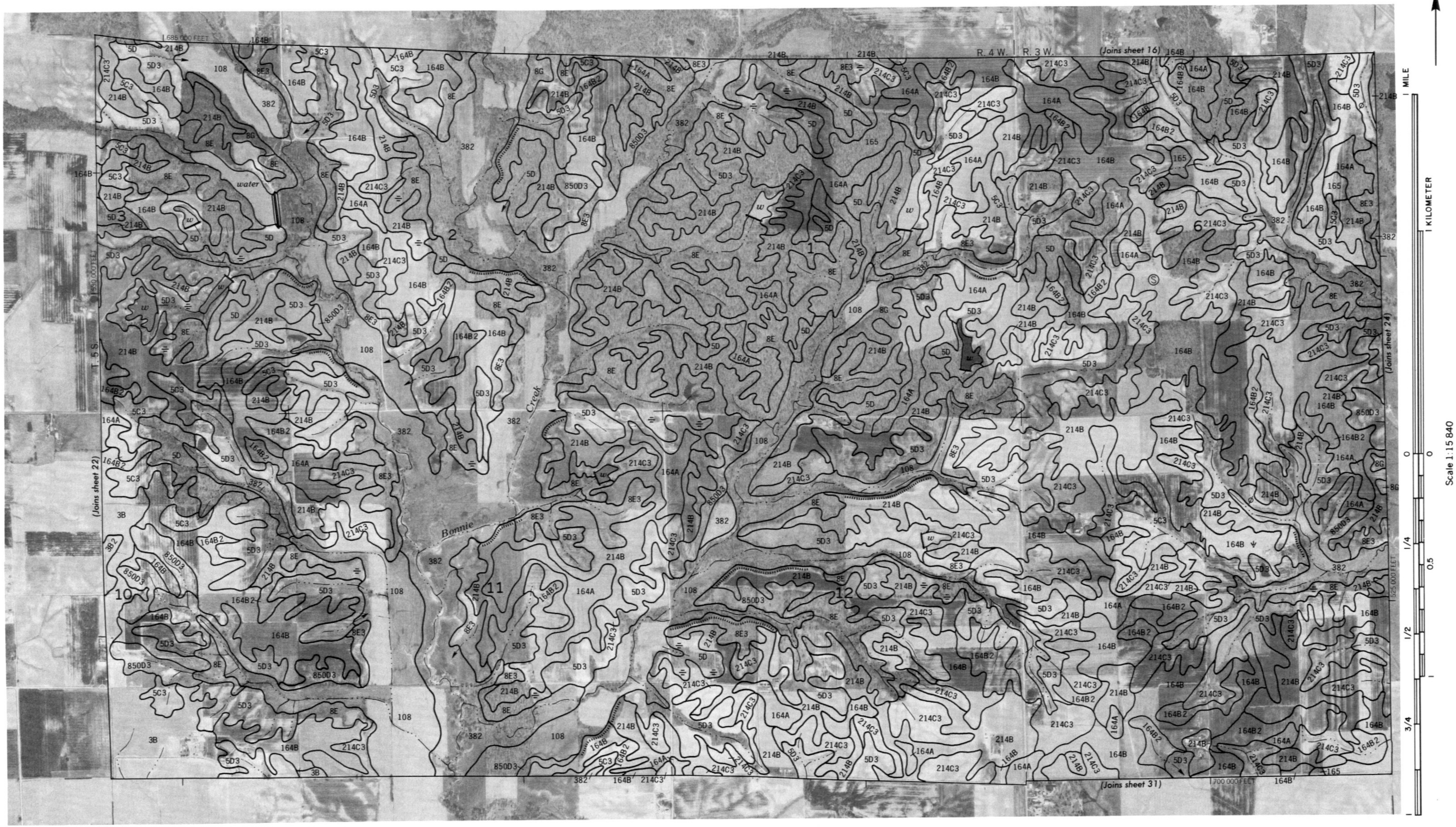

N
(Joins sheet 12)
(Joins sheet 20)
(Joins sheet 26)
(Joins sheet 18)
R. 2 W.
T. 4 S.
740 000 FEET
550 000 FEET
Rock
Branch
Walnut
Creek
White
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

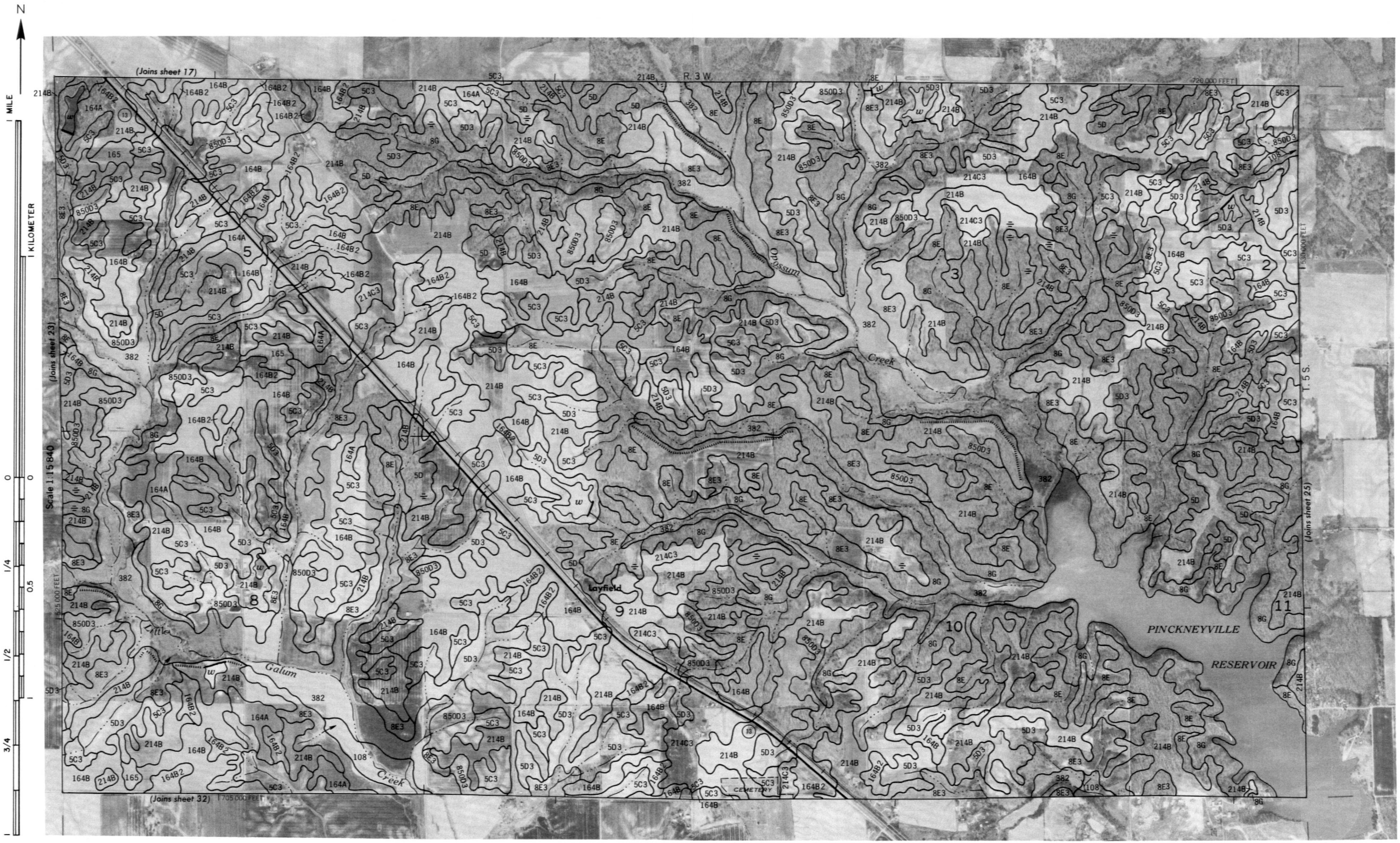

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1
R. 2 W.
R. 1 W.
(Joins sheet 13)
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 27)
775 000 FEET
760 000 FEET
535 000 FEET
T. 4 S.
Walnut
White
Creek
Cedar
Creek
CEMETERY
SEWAGE LAGOON
Tamaroa
51
25
28
29
30
31
32
33
36

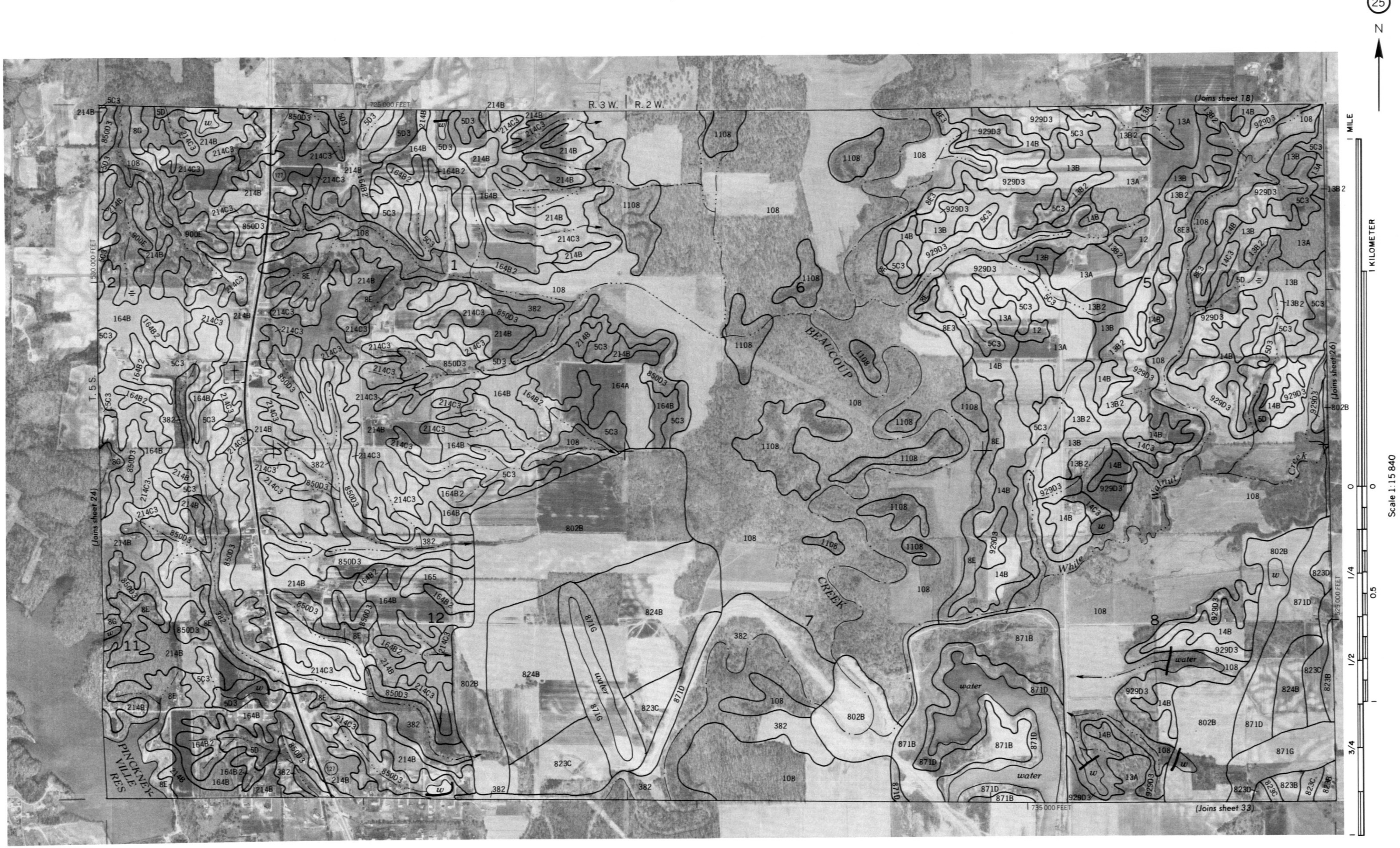

21
N
R. 1 W.
T. 4 S.
(Joins sheet 14)
(Joins sheet 20)
(Joins sheet 28)
780 000 FEET
540 000 FEET
535 000 FEET
795 000 FEET
Collier
Creek
THIRD PRINCIPAL MERIDIAN
JEFFERSON COUNTY
27
26
25
34
35
36
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840

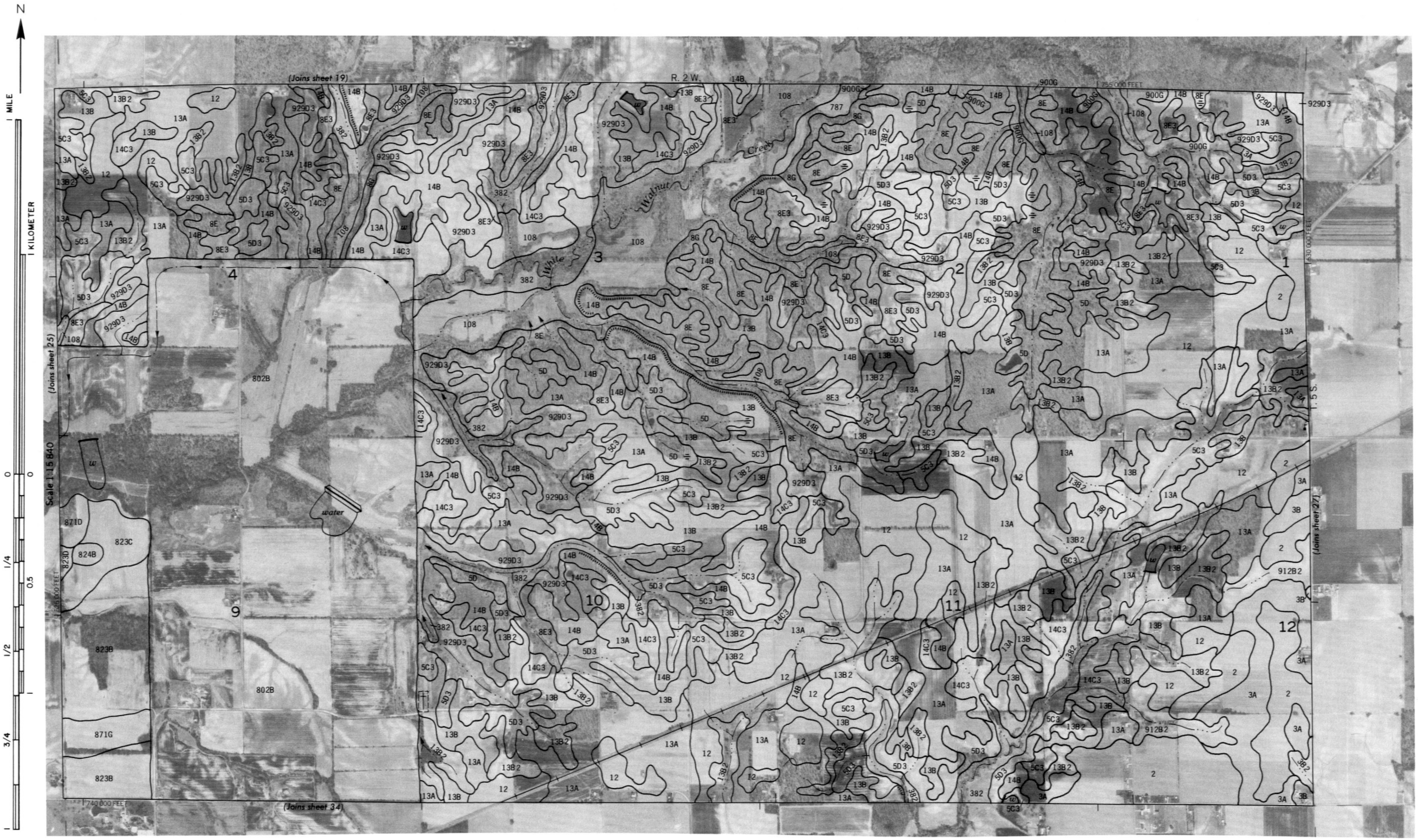
PERRY COUNTY, ILLINOIS — SHEET NUMBER 22

N

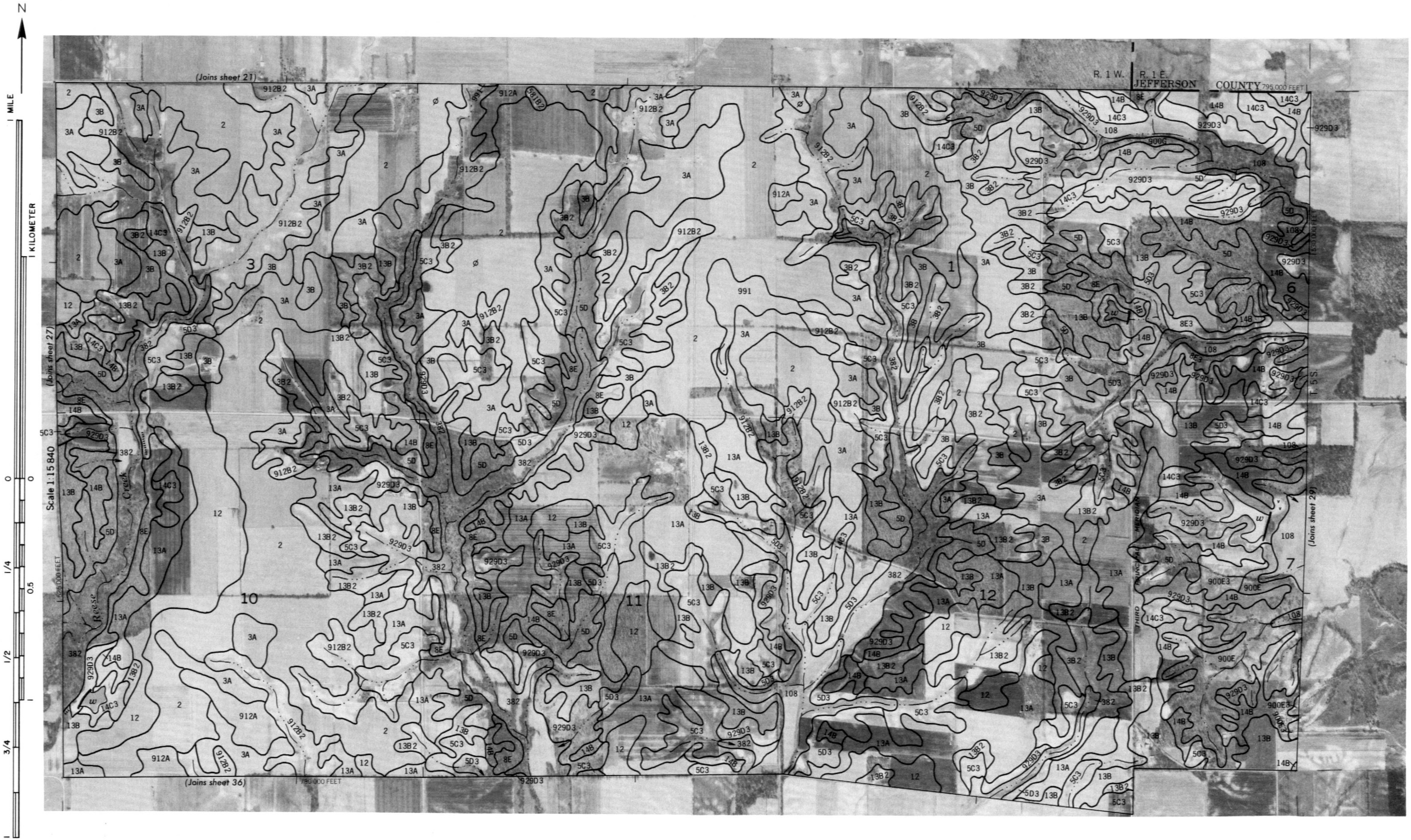

(Joins sheet 16)
(Joins sheet 24)
(Joins sheet 31)
(Joins sheet 22)
R. 4 W.
R. 3 W.
T. 5 S.
1 685 000 FEET
700 000 FEET
water
Bonnie
Creek
1 MILE
1 KILOMETER
Scale 1:15 840

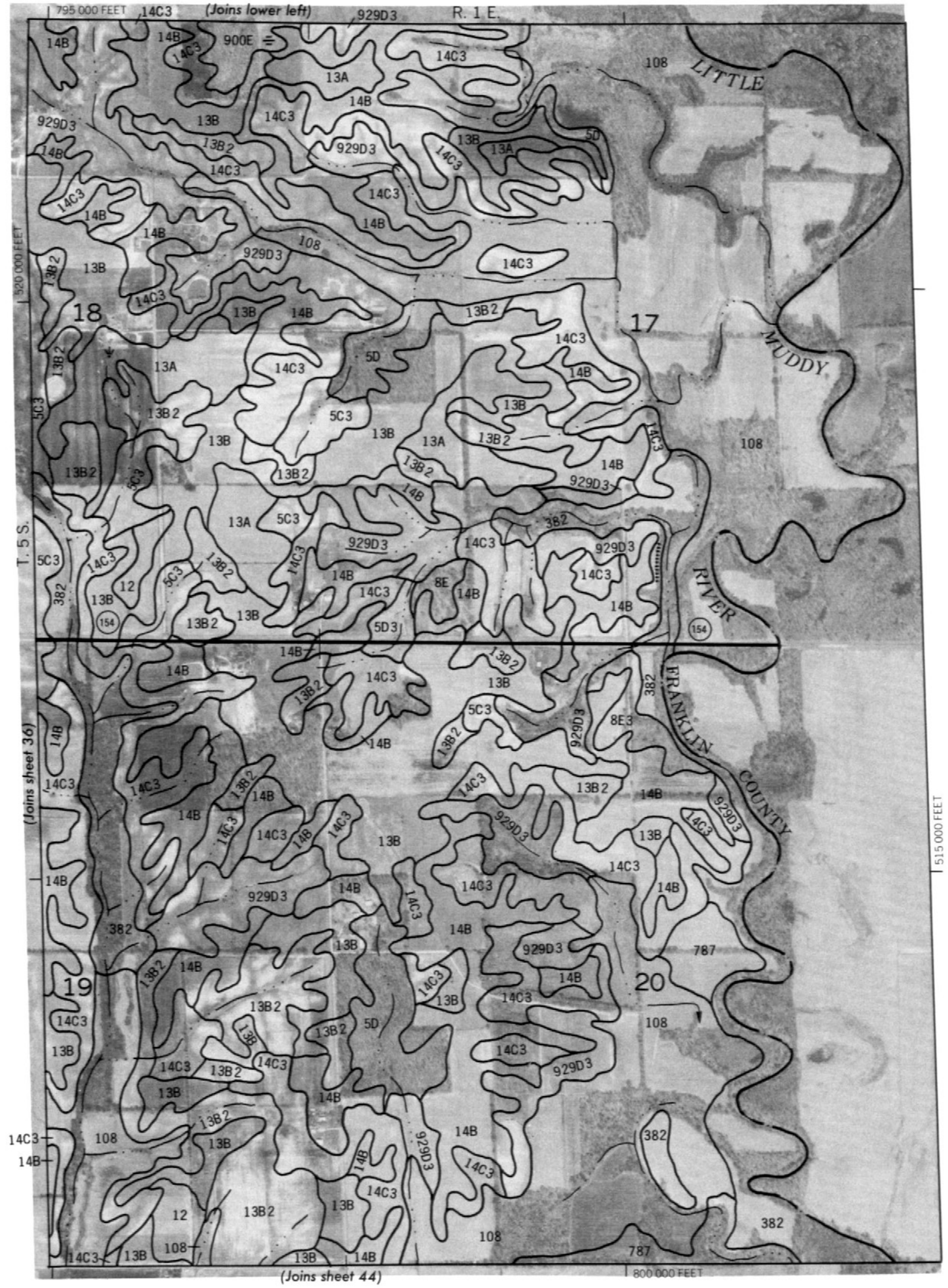

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0
0.5
(Joins sheet 17)
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 32)
R. 3 W.
T. 5 S.
720 000 FEET
530 000 FEET
525 000 FEET
705 000 FEET
Opossum
Creek
Little
Galum
Creek
Layfield
PINCKNEYVILLE
RESERVOIR
CEMETERY
2
3
4
5
8
9
10
11
13

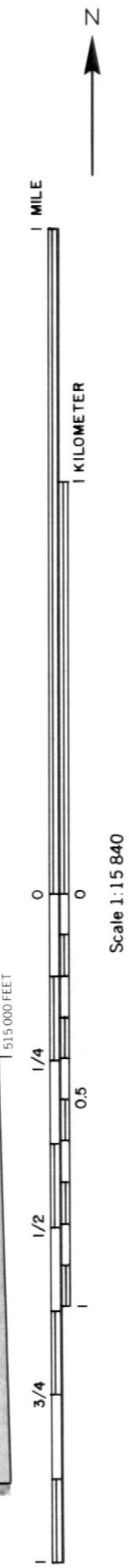

25
N
(Joins sheet 18)
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 33)
R. 3 W.
R. 2 W.
T. 5 S.
725 000 FEET
735 000 FEET
330 000 FEET
320 000 FEET
BEAUCOUP
CREEK
White
Walnut
Creek
PINCKNEY VILLE RES
water
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840


N
MILE
KILOMETER
Scale 1:15 840
(Joins sheet 19)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 34)
R. 2 W.
T. 5 S.
755 000 FEET
630 000 FEET
740 000 FEET
White
Walnut
Creek
water


N
R. 2 W.
R. 1 W.
760 000 FEET
530 000 FEET
T. 5 S.
(Joins sheet 20)
(Joins sheet 28)
(Joins sheet 35)
(Joins sheet 26)
775 000 FEET
Reese Creek
1 MILE
1 KILOMETER
Scale 1:15 840
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

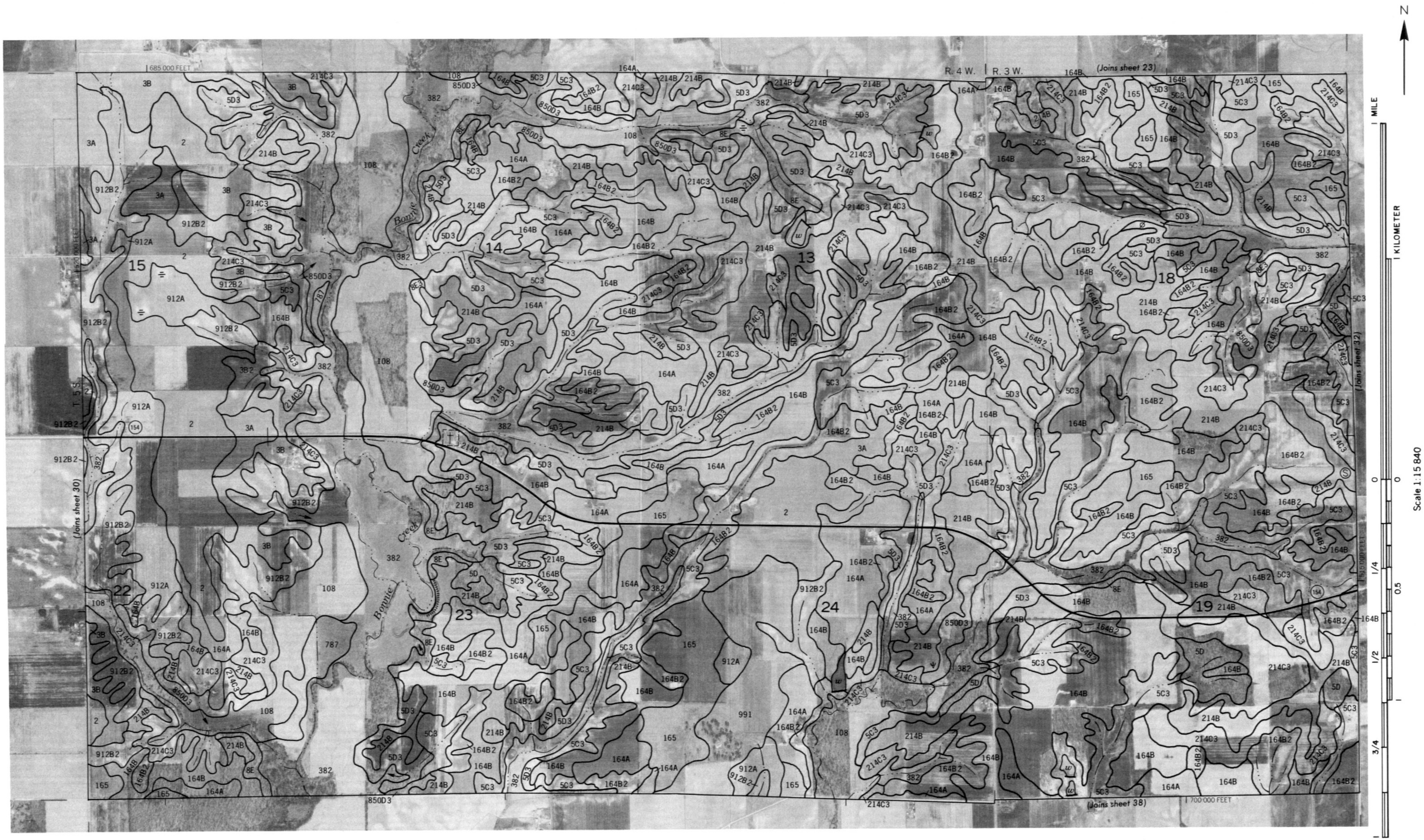

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 21)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 36)
R. 1 W.
R. 1 E.
JEFFERSON COUNTY
795 000 FEET
790 000 FEET
T. 5 S.
THIRD PRINCIPAL MERIDIAN
Reese Creek
1
2
3
6
7
10
11
12



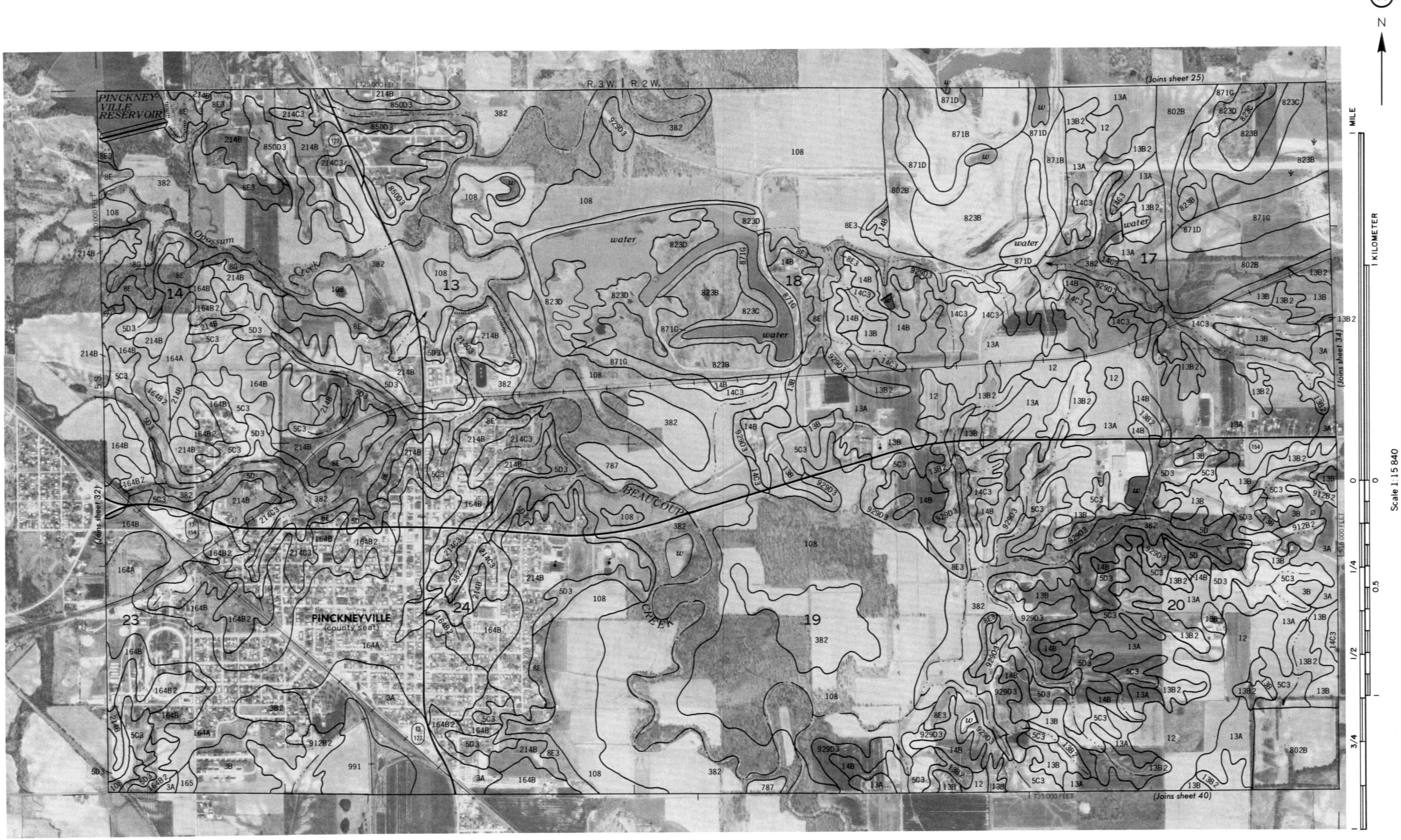


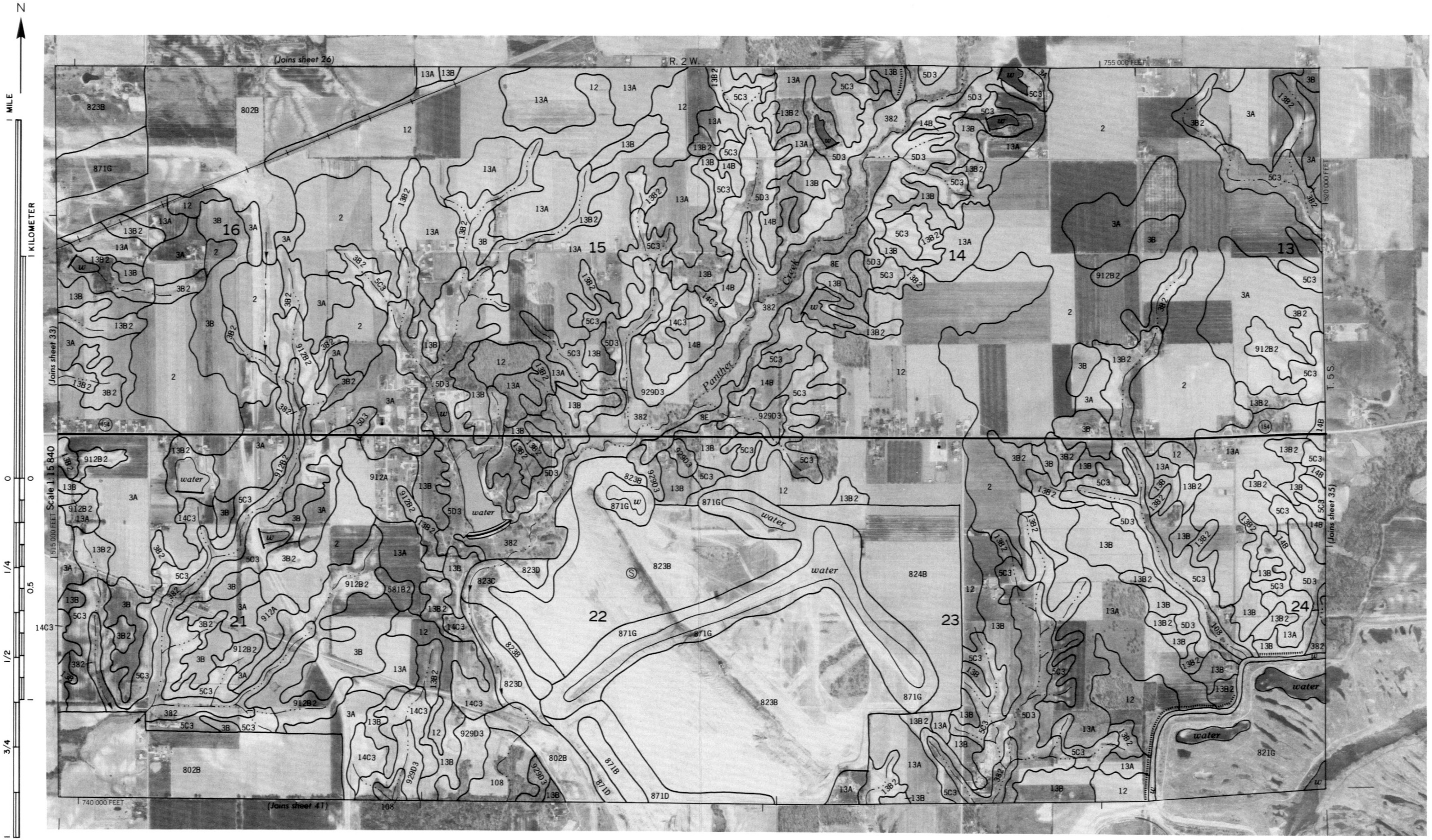
4000 AND 5000-FOOT GRID TICKS


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 22)
R. 4 W.
(Joins sheet 37)
(Joins sheet 31)
T. 5 S.
RANDOLPH COUNTY
Galum Creek
680 000 FEET
670 000 FEET
515 000 FEET
520 000 FEET
15
16
17
18
19
20
21
22

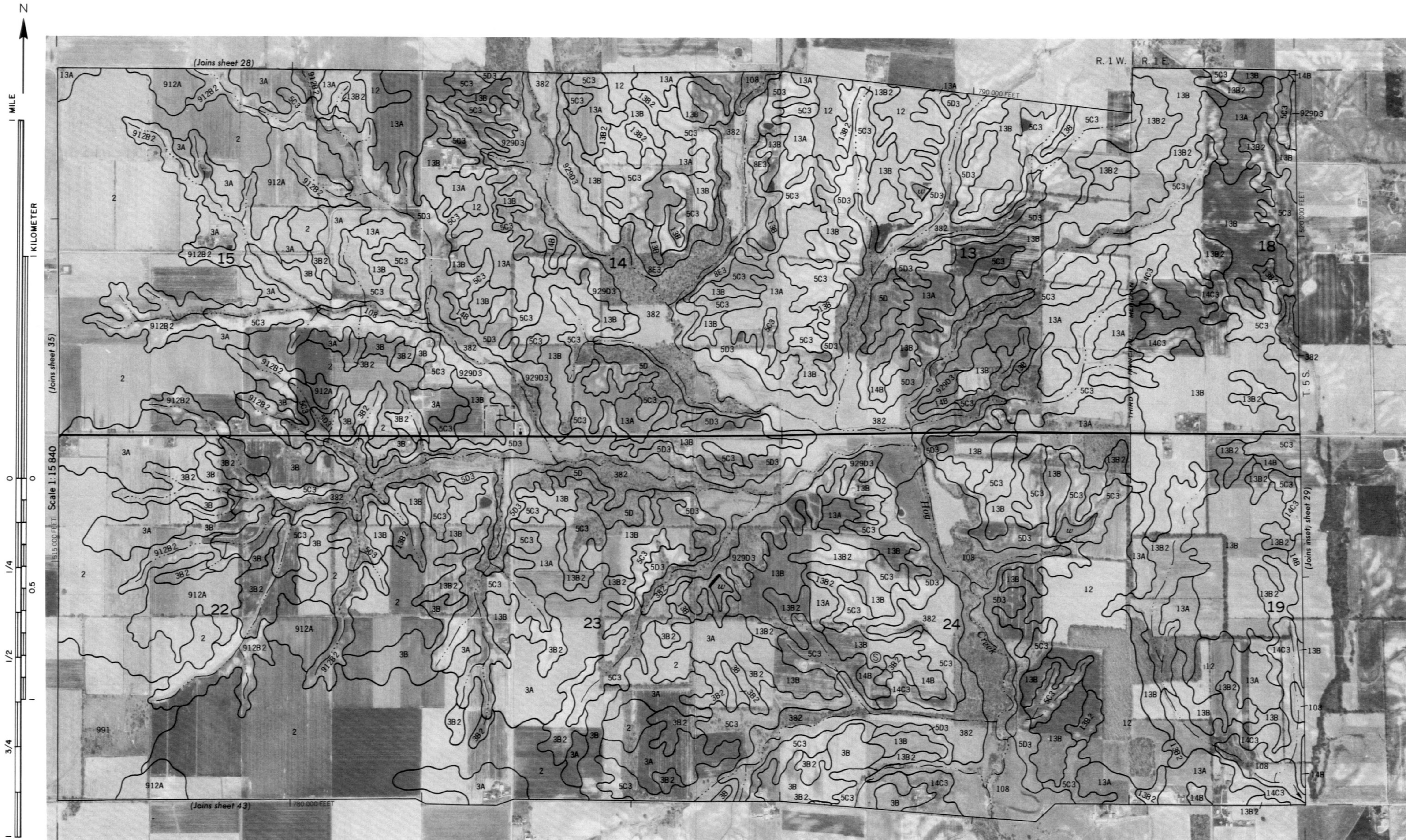

N
(Joins sheet 23)
R. 4 W.
R. 3 W.
685 000 FEET
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 38)
700 000 FEET
T. 5 S.
Bonnie Creek
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
15
14
13
18
22
23
24
19

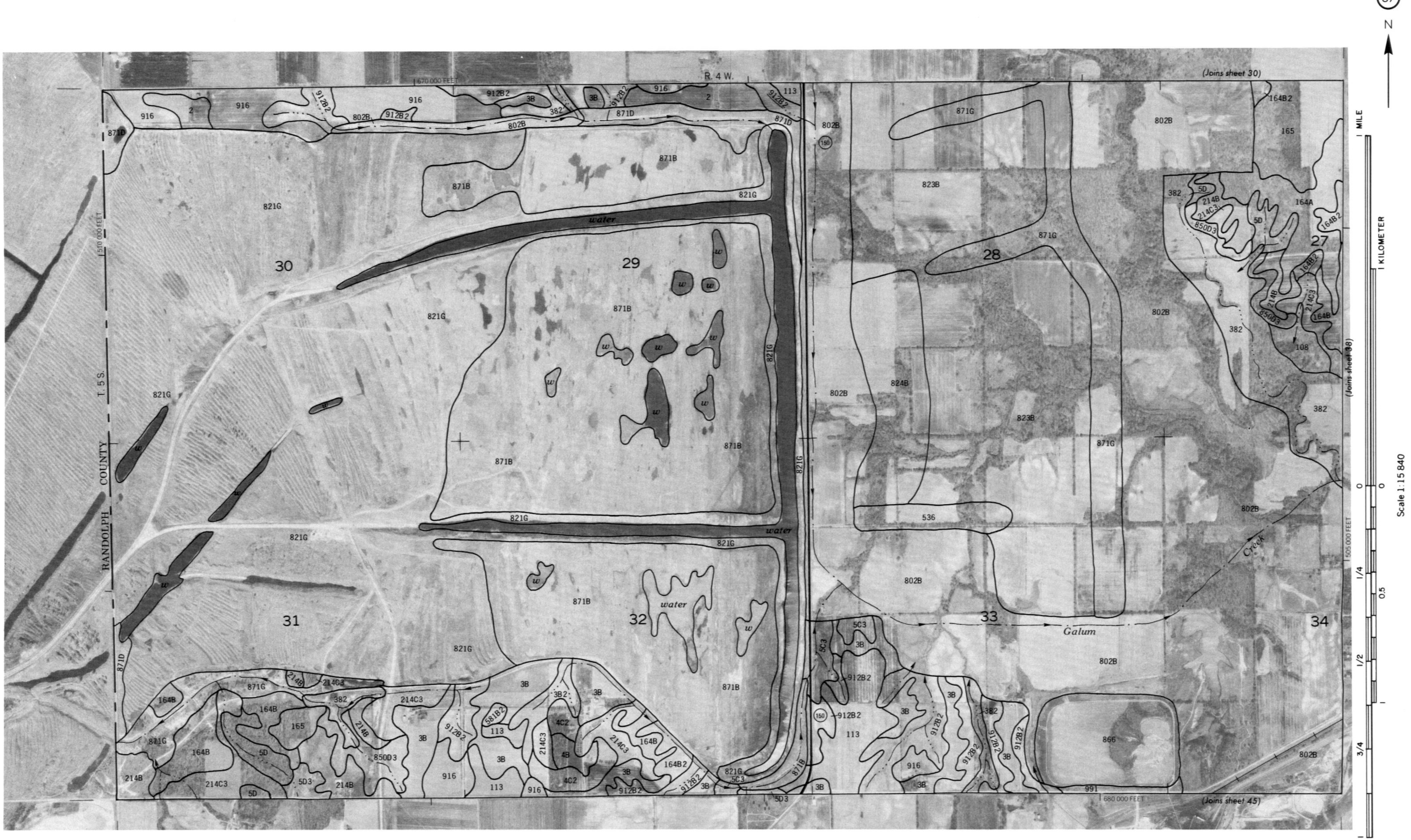

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0
0.5
1
(Joins sheet 24)
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 39)
R. 3 W.
T. 5 S.
720 000 FEET
705 000 FEET
515 000 FEET
CEMETERY
Little
Cahum
Creek
Chicken
Creek
14
15
16
17
20
21
22
23


33
N
PINCKNEYVILLE RESERVOIR
R. 3 W. | R. 2 W.
(Joins sheet 25)
(Joins sheet 34)
(Joins sheet 40)
(Joins sheet 32)
725 000 FEET
735 000 FEET
190 000 FEET
180 000 FEET
Opossum Creek
BEAUCOUP CREEK
PINCKNEYVILLE
(county seat)
water
13
14
17
18
19
20
23
24
MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

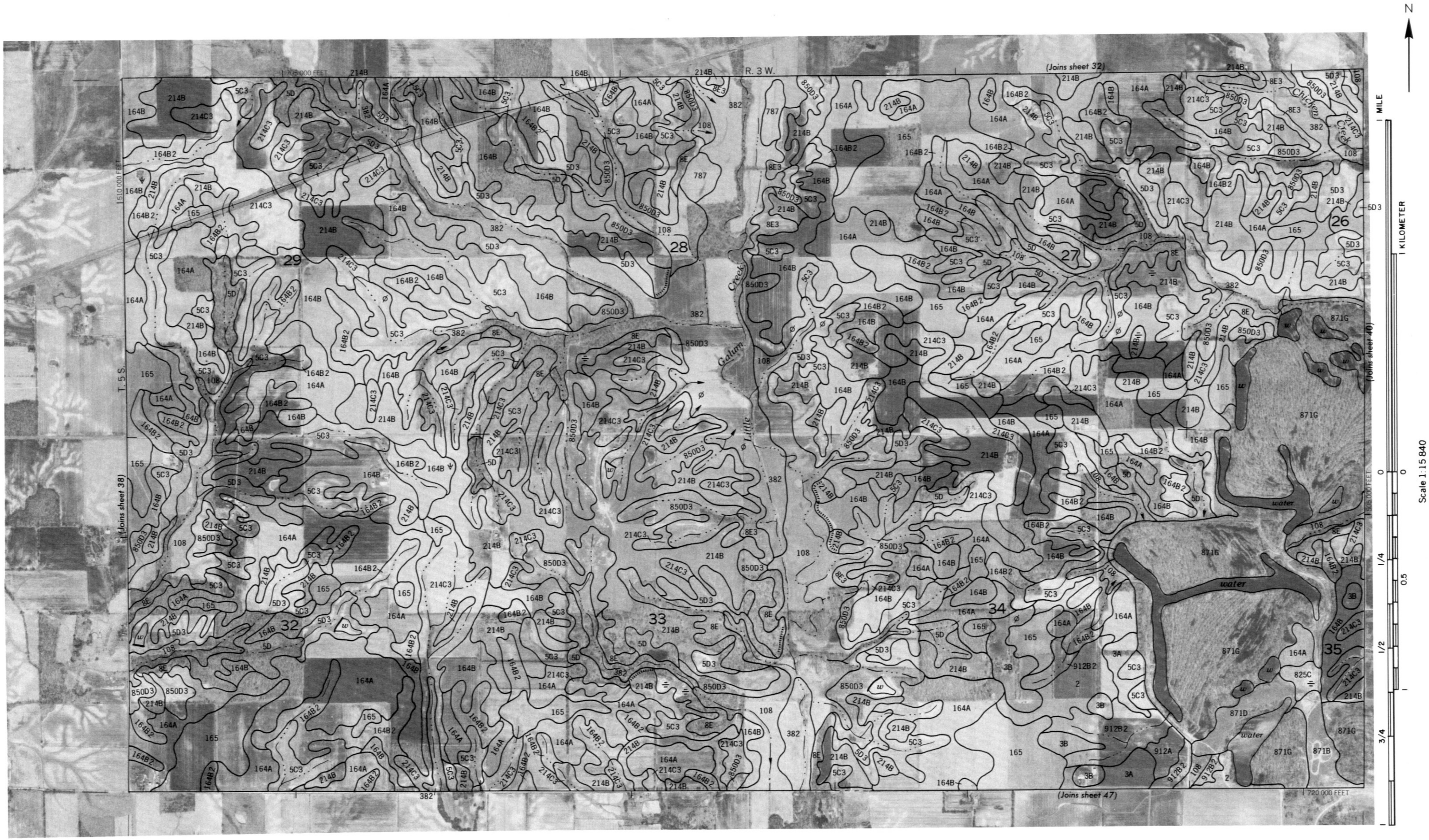

N
(Joins sheet 26)
R. 2 W.
755 000 FEET
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 41)
T. 5 S.
740 000 FEET
515 000 FEET
520 000 FEET
Scale 1:15 840
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Panther Creek
water
13
14
15
16
21
22
23
24

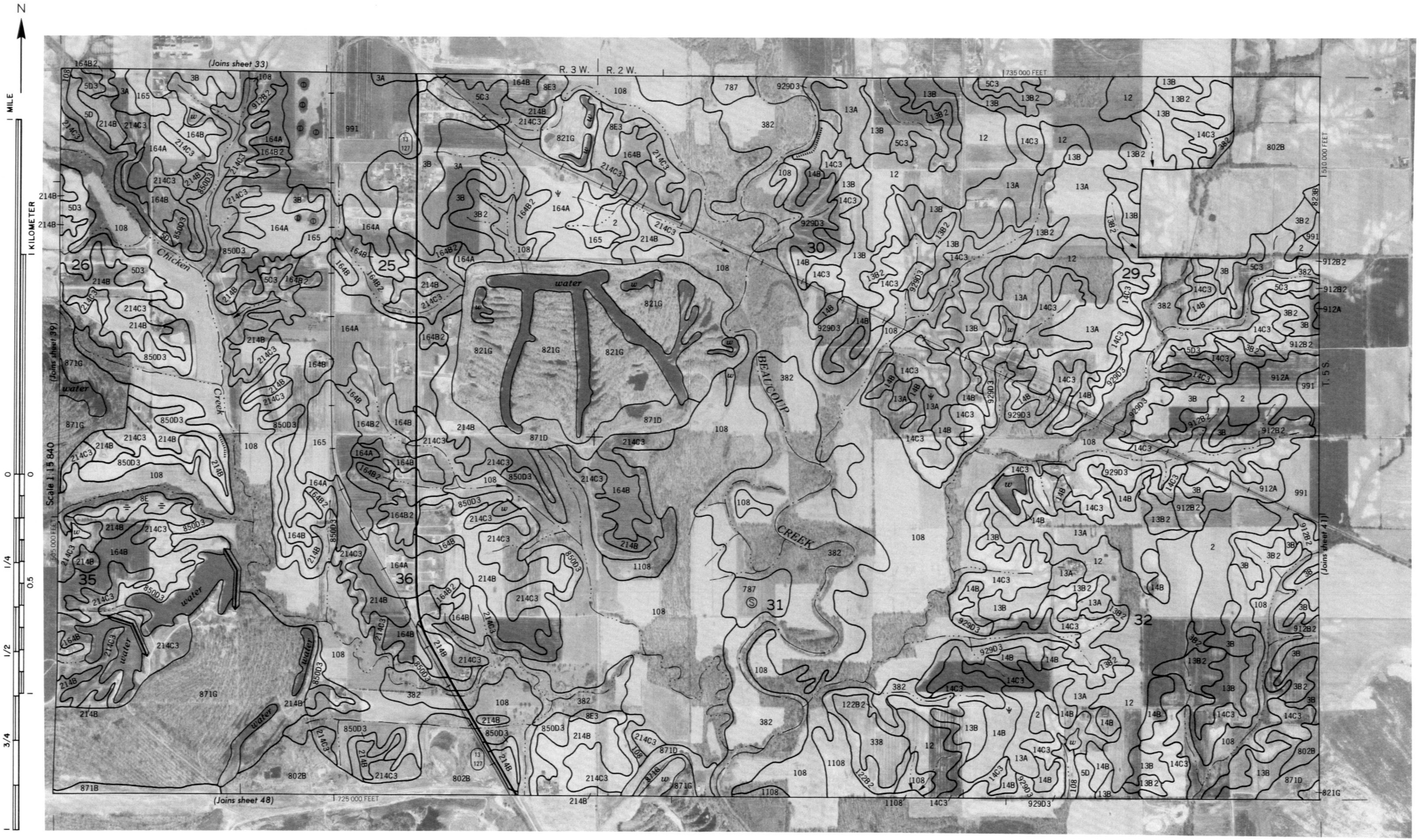

N
R. 2 W.
R. 1 W.
760 000 FEET
520 000 FEET
515 000 FEET
775 000 FEET
T. 5 S.
(Joins sheet 27)
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 42)
13
16
17
18
19
20
21
24
Beaucoup
Creek
Little
Reese
Creek
water
DUQUOIN
LAKE
MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840

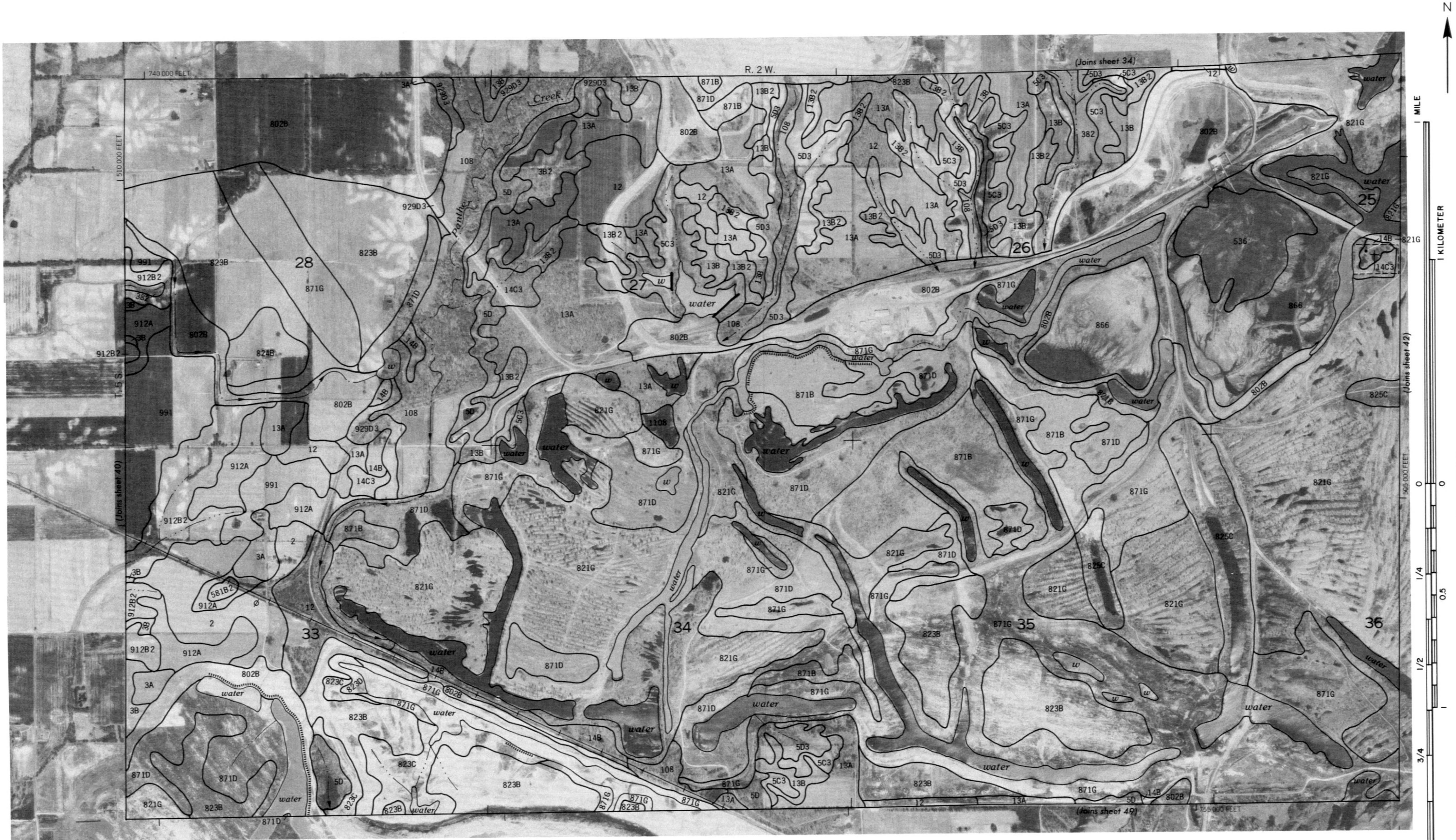

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 28)
(Joins sheet 35)
(Joins sheet 43)
(Joins inset, sheet 29)
R. 1 W.
R. 1 E.
T. 5 S.
THIRD PRINCIPAL MERIDIAN
790 000 FEET
780 000 FEET
515 000 FEET
520 000 FEET
15
14
13
18
22
23
24
19
Hog Creek


37
N
(Joins sheet 30)
(Joins sheet 38)
(Joins sheet 45)
R. 4 W.
T. 5 S.
RANDOLPH COUNTY
670 000 FEET
510 000 FEET
505 000 FEET
680 000 FEET
water
Galum
Creek
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
30
29
28
27
31
32
33
34

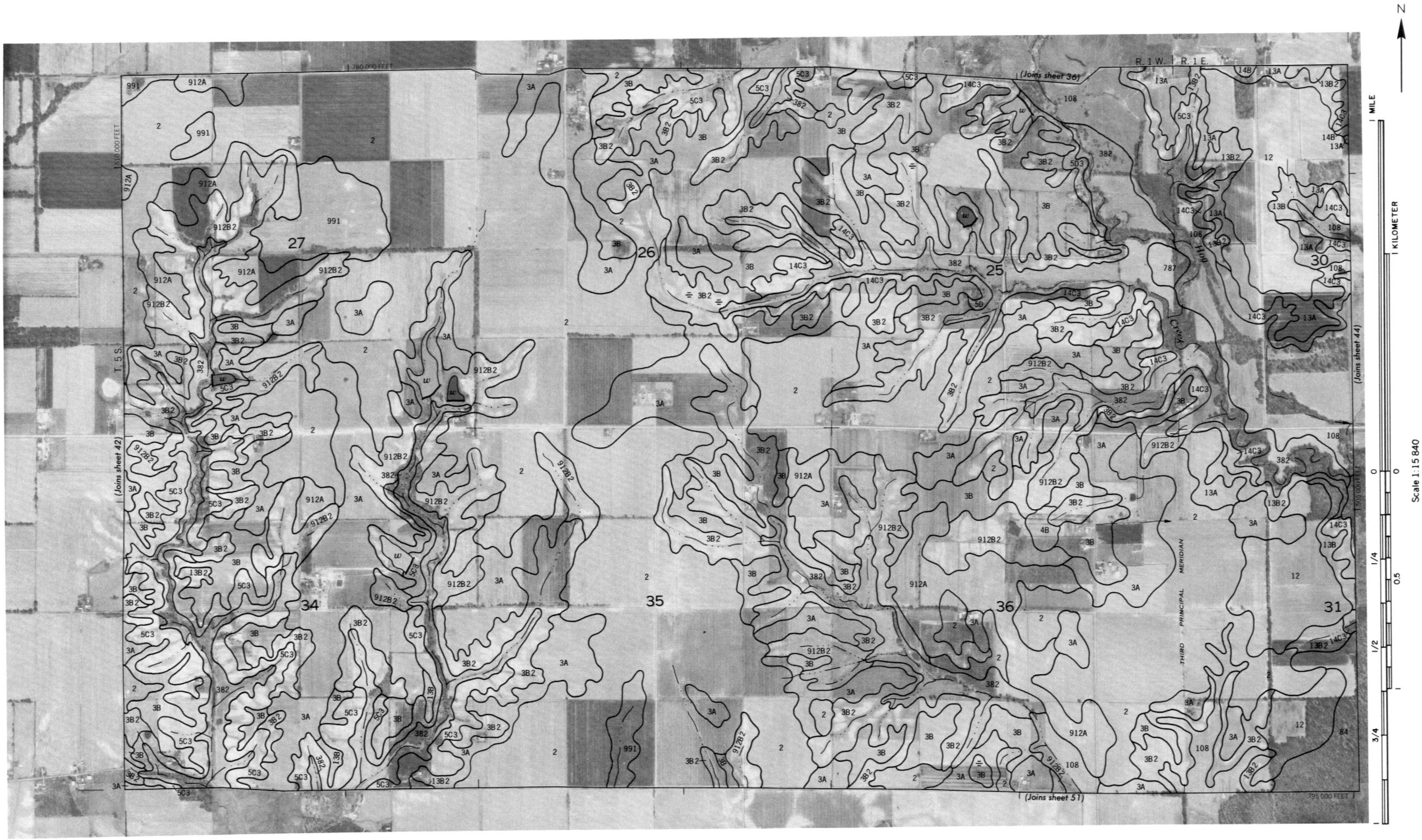

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0
0.5
1
(Joins sheet 31)
R. 4 W.
R. 3 W.
700 000 FEET
510 000 FEET
T. 5 S.
(Joins sheet 37)
(Joins sheet 39)
(45)
(Joins sheet 46)
685 000 FEET
505 000 FEET
Creek
Bonnie
Creek
Conant
water
27
26
25
30
34
35
36
31


N
(Joins sheet 32)
(Joins sheet 40)
(Joins sheet 47)
(Joins sheet 38)
R. 3 W.
T. 5 S.
705 000 FEET
510 000 FEET
720 000 FEET
500 000 FEET
Chicken Creek
Galum Creek
Little
28
29
26
27
32
33
34
35
water
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
1

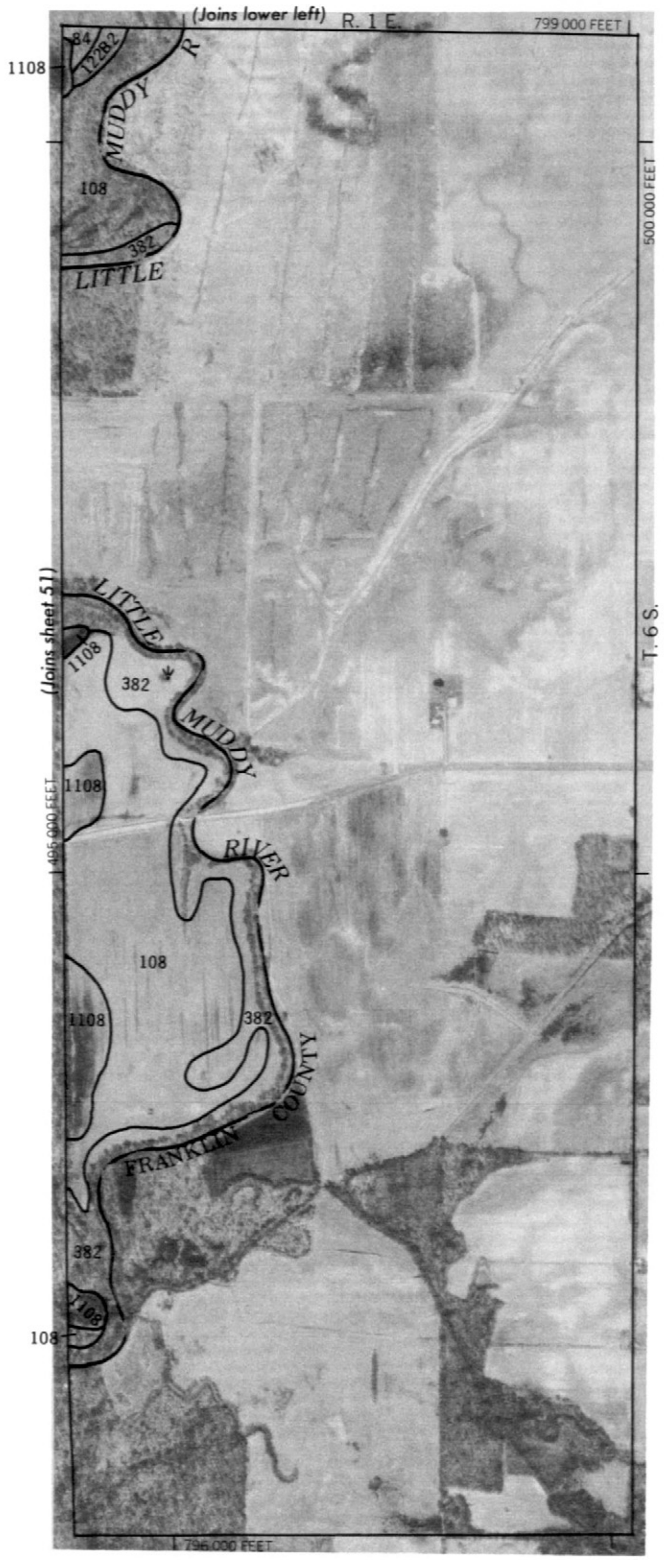

N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 33)
R. 3 W.
R. 2 W.
735 000 FEET
510 000 FEET
T. 5 S.
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 48)
725 000 FEET
Chicken
Creek
BEAUCOUP
CREEK
water
25
26
29
30
31
32
35
36


N
(Joins sheet 34)
R. 2 W.
740 000 FEET
510 000 FEET
T. 5 S.
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 49)
505 000 FEET
755 000 FEET
Panther
Creek
25
26
27
28
33
34
35
36
water
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


N
MILE
KILOMETER
Scale 1:15 840
R. 2 W.
R. 1 W.
(Joins sheet 35)
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 50)
T. 5 S.
Sunfield
DUQUOIN LAKE
Reese Creek
water
25
28
29
30
31
32
33
36


N
(Joins sheet 36)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 51)
R. 1 W.
R. 1 E.
T. 5 S.
760 000 FEET
510 000 FEET
795 000 FEET
27
26
25
30
34
35
36
31
Hog Creek
THIRD PRINCIPAL MERIDIAN
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840

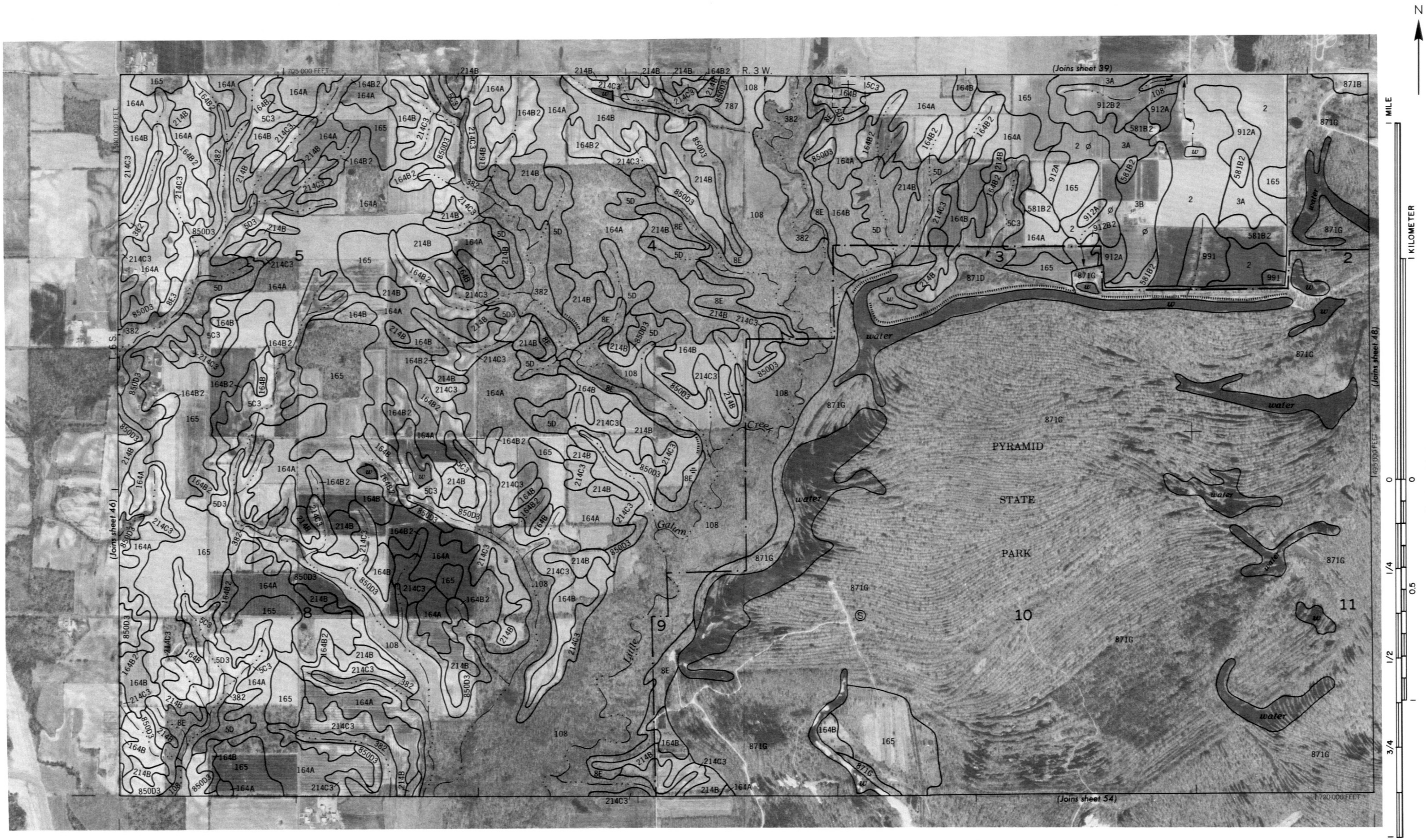
PERRY COUNTY, ILLINOIS — SHEET NUMBER 44



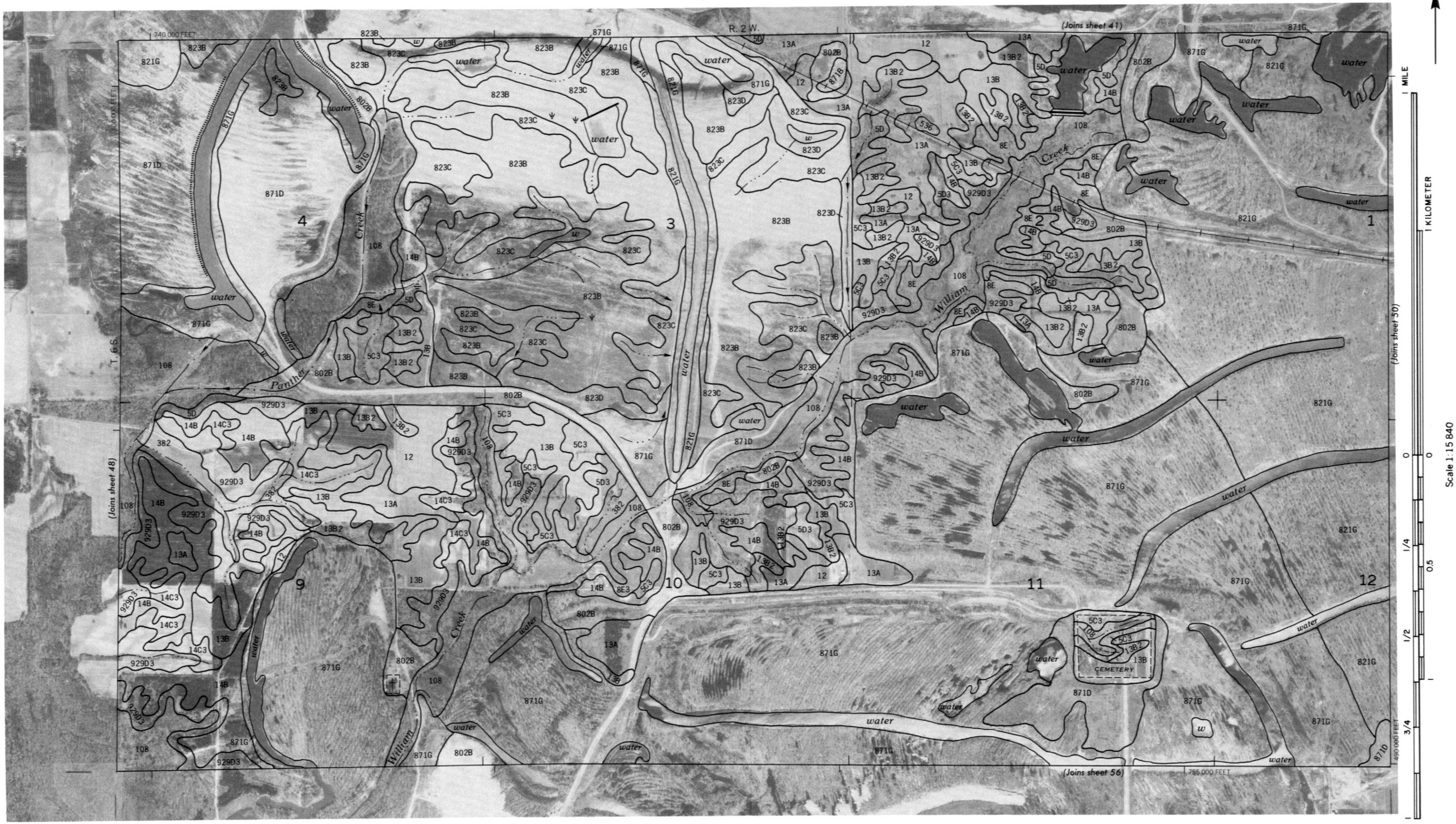
3000 AND 5000-FOOT GRID TICKS


N
R. 4 W.
670 000 FEET
680 000 FEET
500 000 FEET
495 000 FEET
(Joins sheet 37)
(38)
(Joins sheet 46)
(Joins sheet 52)
RANDOLPH COUNTY
T. 6 S.
Cutler
water
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

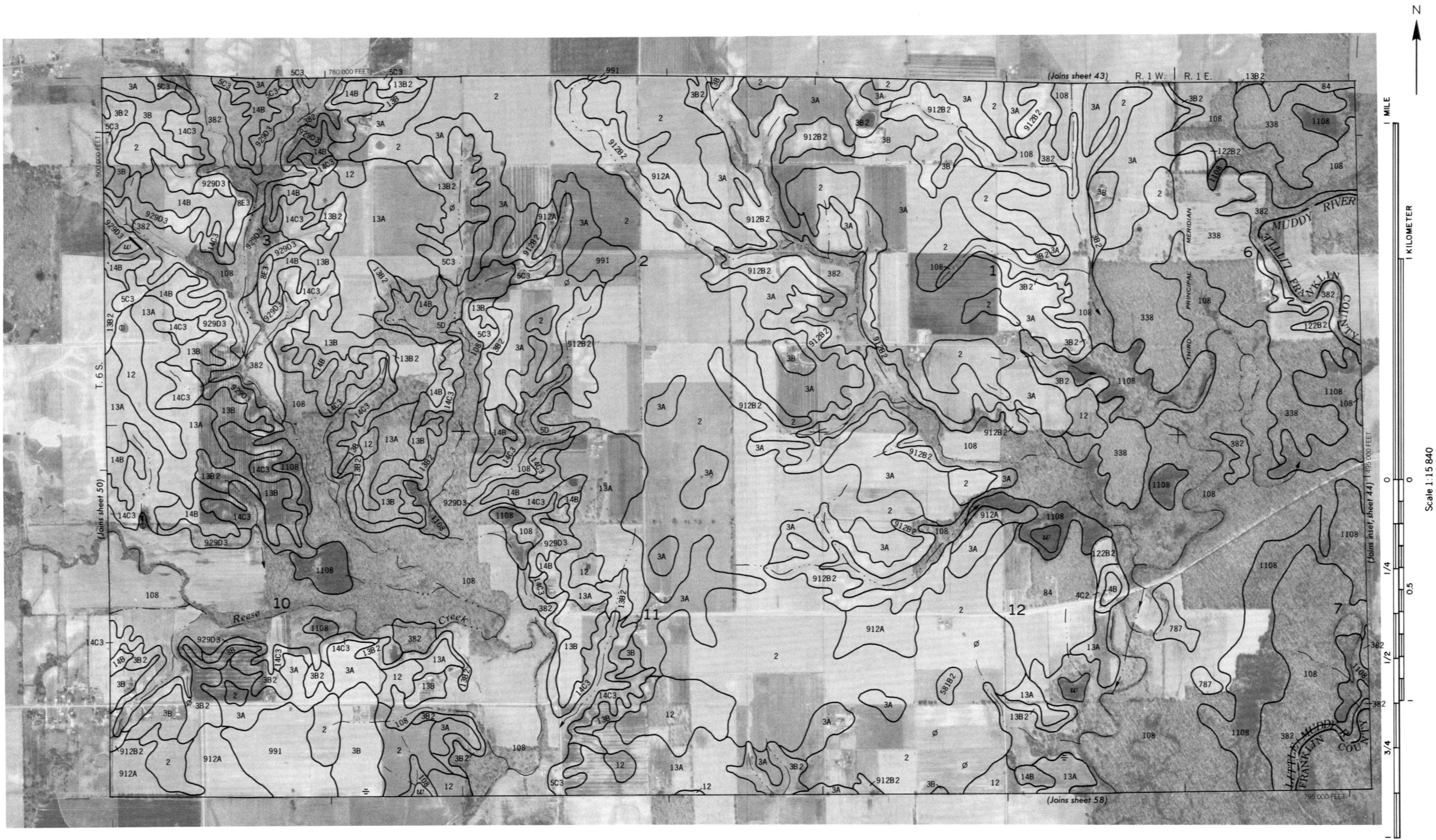

N
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 38)
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 53)
R. 4 W.
R. 3 W.
T. 6 S.
700 000 FEET
500 000 FEET
495 000 FEET
685 000 FEET
Galum
Creek
water
w
1
2
3
6
7
10
11
12
871B
871D
871G
866
823B
823C
823D
824B
536
802B
113
912B2
916
991
214B
214C3
382
108
5D
5D3
5C3
8E
8E3
850D3
164A
164B
164B2
165


N
(Joins sheet 39)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 54)
R. 3 W.
T. 6 S.
705 000 FEET
720 000 FEET
PYRAMID
STATE
PARK
Little Galum Creek
water
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
0
1/4
0.5
1/2
3/4
1
(Joins sheet 40)
R. 3 W.
R. 2 W.
735 000 FEET
500 000 FEET
505 000 FEET
725 000 FEET
(Joins sheet 47)
(Joins sheet 49)
(Joins sheet 55)
Scale 1:15 840
PYRAMID
STATE
PARK
T. 6 S.
BEAUCOUP
CREEK
Pipestone
1
2
5
6
7
8
11
12
water
871G
871B
802B
871D
536
866
823C
823B
912A
912B2
3B
581B2
214B
214C3
108
1108
382
787
13B
14B
14C3
929D3
850D3
164B
164B2

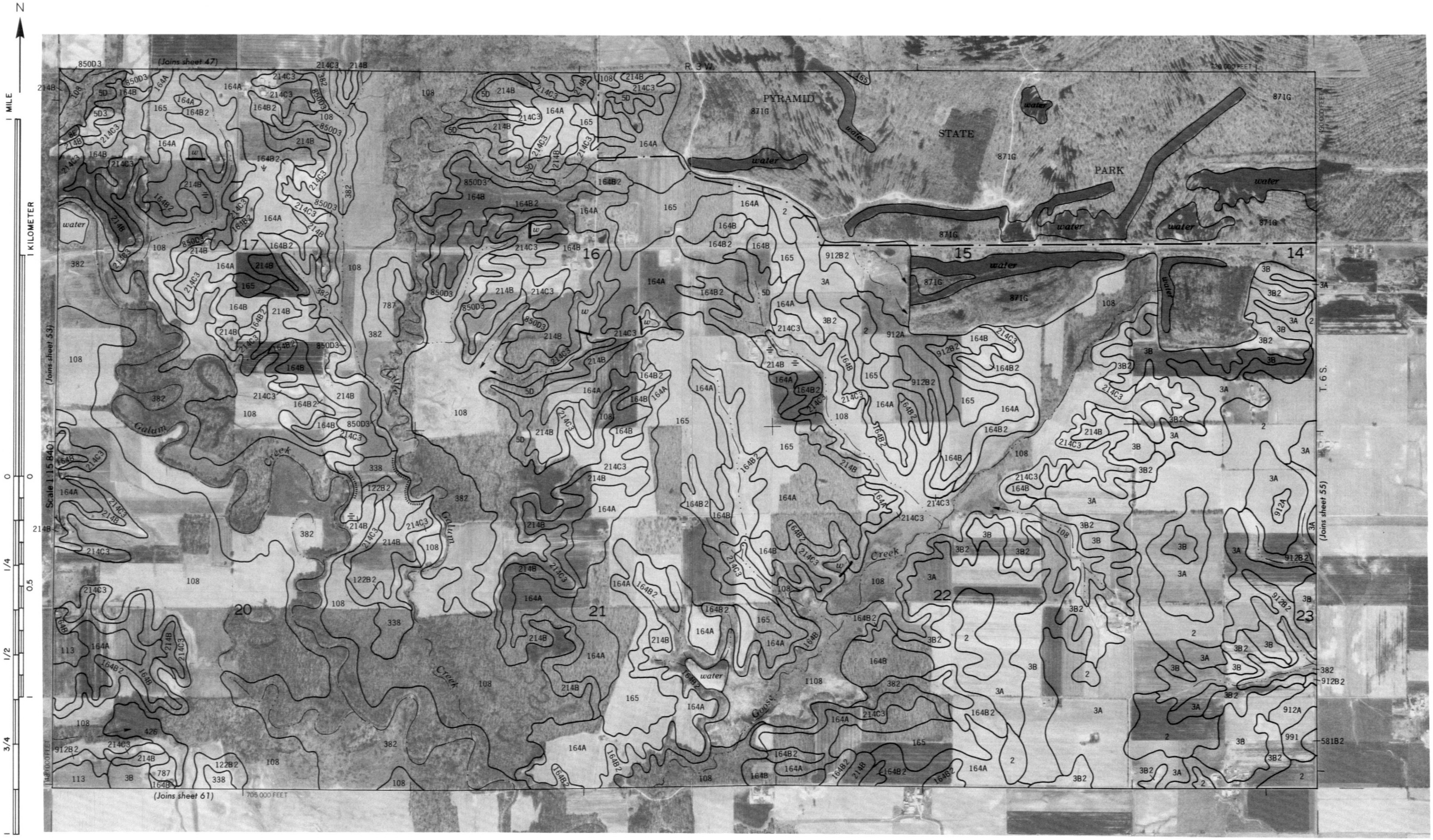

N
(Joins sheet 41)
(Joins sheet 50)
(Joins sheet 56)
(Joins sheet 48)
R. 2 W.
T. 6 S.
740 000 FEET
755 000 FEET
490 000 FEET
Panther
Creek
William
Creek
CEMETERY
1
2
3
4
9
10
11
12
1 MILE
3/4
1/2
1/4
0
1 KILOMETER
0.5
Scale 1:15 840

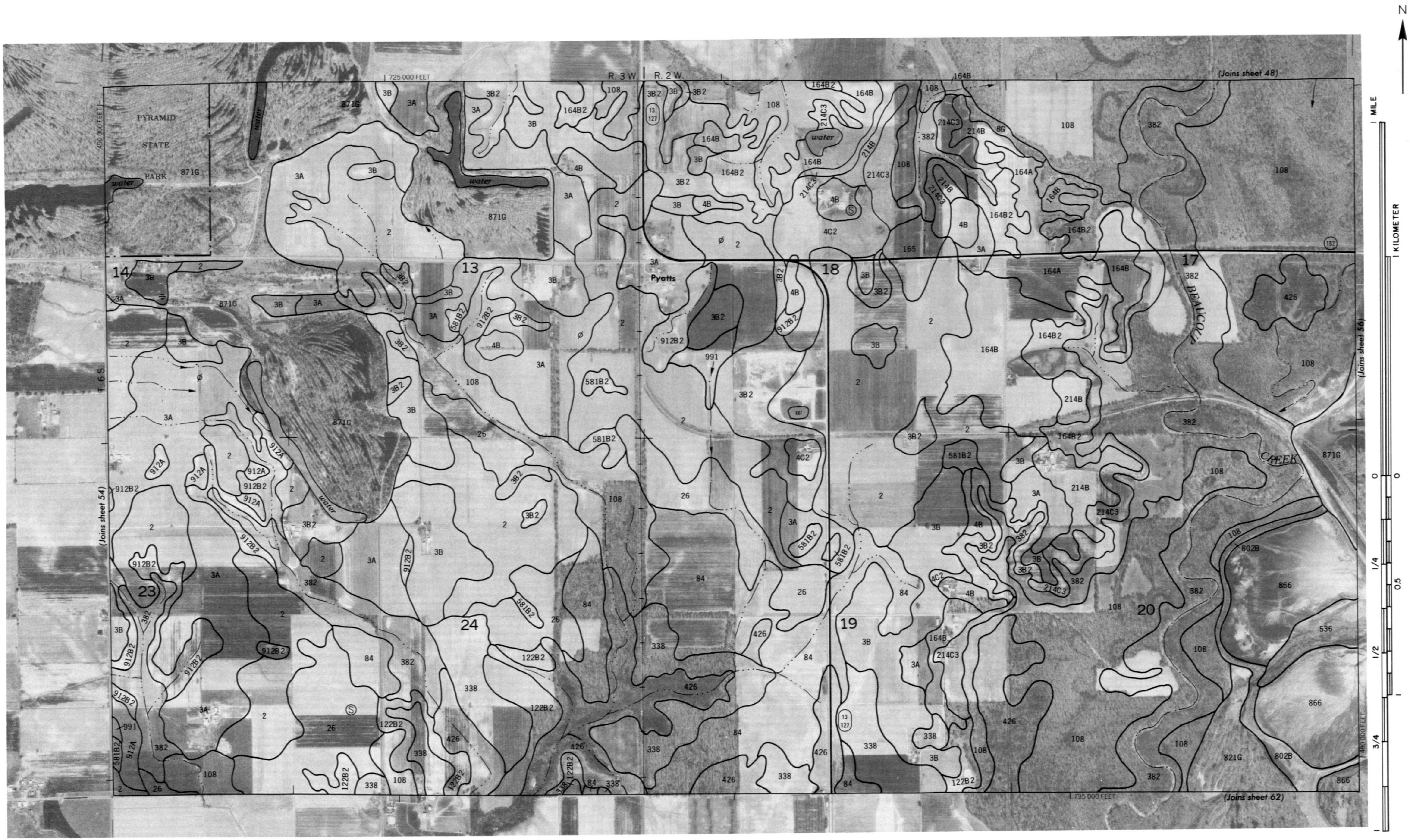

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
R. 2 W.
R. 1 W.
(Joins sheet 42)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 57)
T. 6 S.
Saint Johns
DUQUOIN
Reese
Creek
775 000 FEET
500 000 FEET
490 000 FEET
760 000 FEET

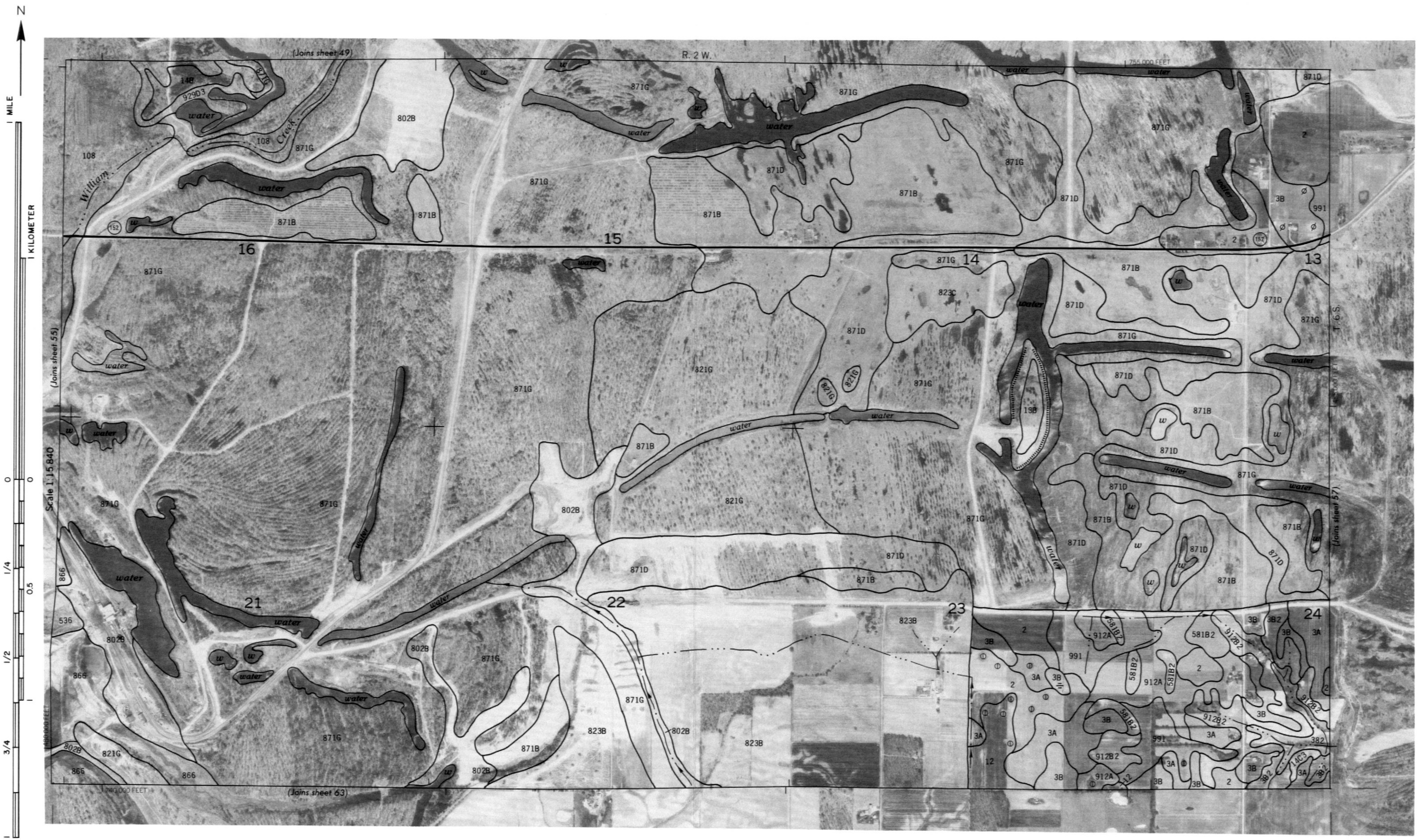

N
(Joins sheet 43)
R. 1 W.
R. 1 E.
780 000 FEET
500 000 FEET
T. 6 S.
(Joins sheet 50)
(Joins inset, sheet 44)
(Joins sheet 58)
795 000 FEET
MUDDY RIVER
LITTLE MUDDY RIVER
FRANKLIN COUNTY
Reese Creek
THIRD PRINCIPAL MERIDIAN
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

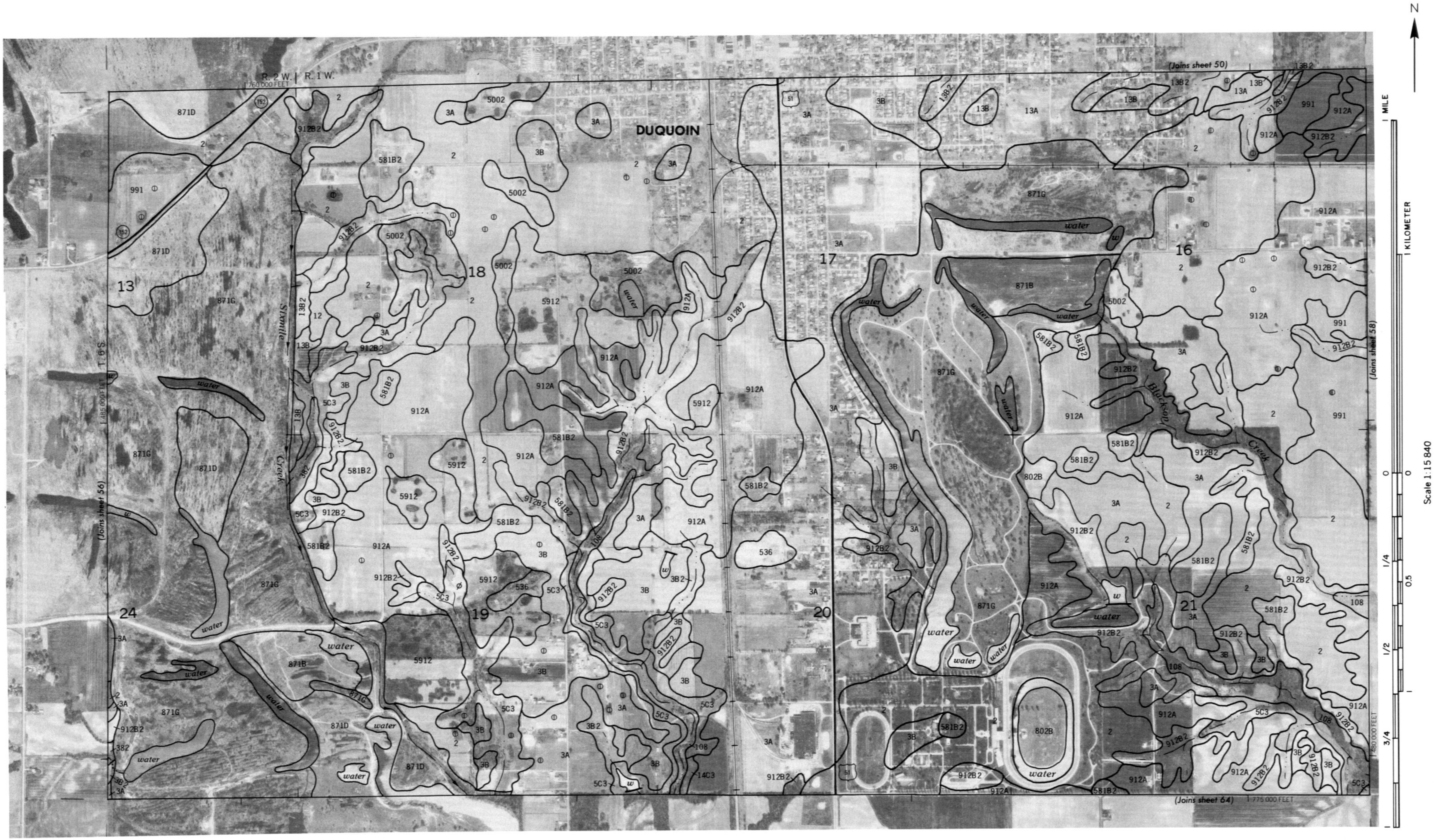
PERRY COUNTY, ILLINOIS — SHEET NUMBER 52


N
(Joins sheet 46)
R. 4 W.
R. 3 W.
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 60)
T. 6 S.
700 000 FEET
480 000 FEET
490 000 FEET
Pipestone
Creek
Galum
Creek
1 MILE
3/4
1/2
1/4
0
1 KILOMETER
0.5
0
Scale 1:15 840
13
14
15
18
19
22
23
24
802B
871G
823B
824B
871B
871D
382
108
214B
214C3
912B2
581B2
916
850D3
5C3
912A
3B
2
113
164A
164B
164B2
water


N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 47)
(Joins sheet 53)
(Joins sheet 55)
(Joins sheet 61)
R. 3 W.
T. 6 S.
705 000 FEET
PYRAMID
STATE
PARK
water
Galum Creek
Little Galum
Goose Creek
Creek
14
15
16
17
20
21
22
23


N
R. 3 W.
R. 2 W.
725 000 FEET
735 000 FEET
490 000 FEET
480 000 FEET
(Joins sheet 48)
(Joins sheet 54)
(Joins sheet 56)
(Joins sheet 62)
PYRAMID
STATE
PARK
Pyatts
T. 6 S.
BEAUCOUP
CREEK
water
14
13
18
17
23
24
19
20
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840

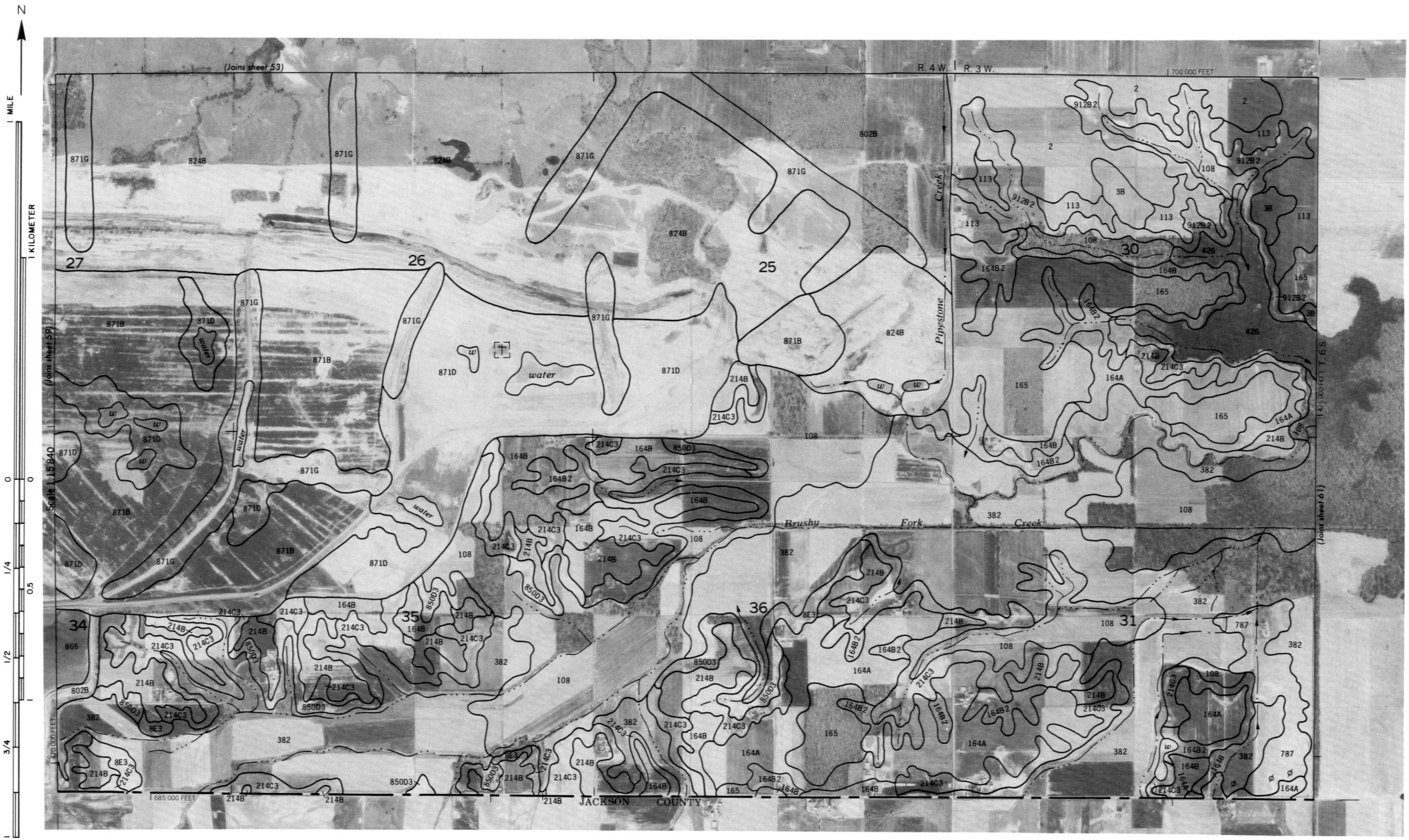

N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 49)
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 63)
R. 2 W.
T. 6 S.
755 000 FEET
740 000 FEET
William Creek
16
15
14
13
21
22
23
24
water
871G
871D
871B
802B
823B
823C
821G
108
14B
929D3
866
536
991
2
3A
3B
12
912A
912B2
581B2
382
14C3
19B

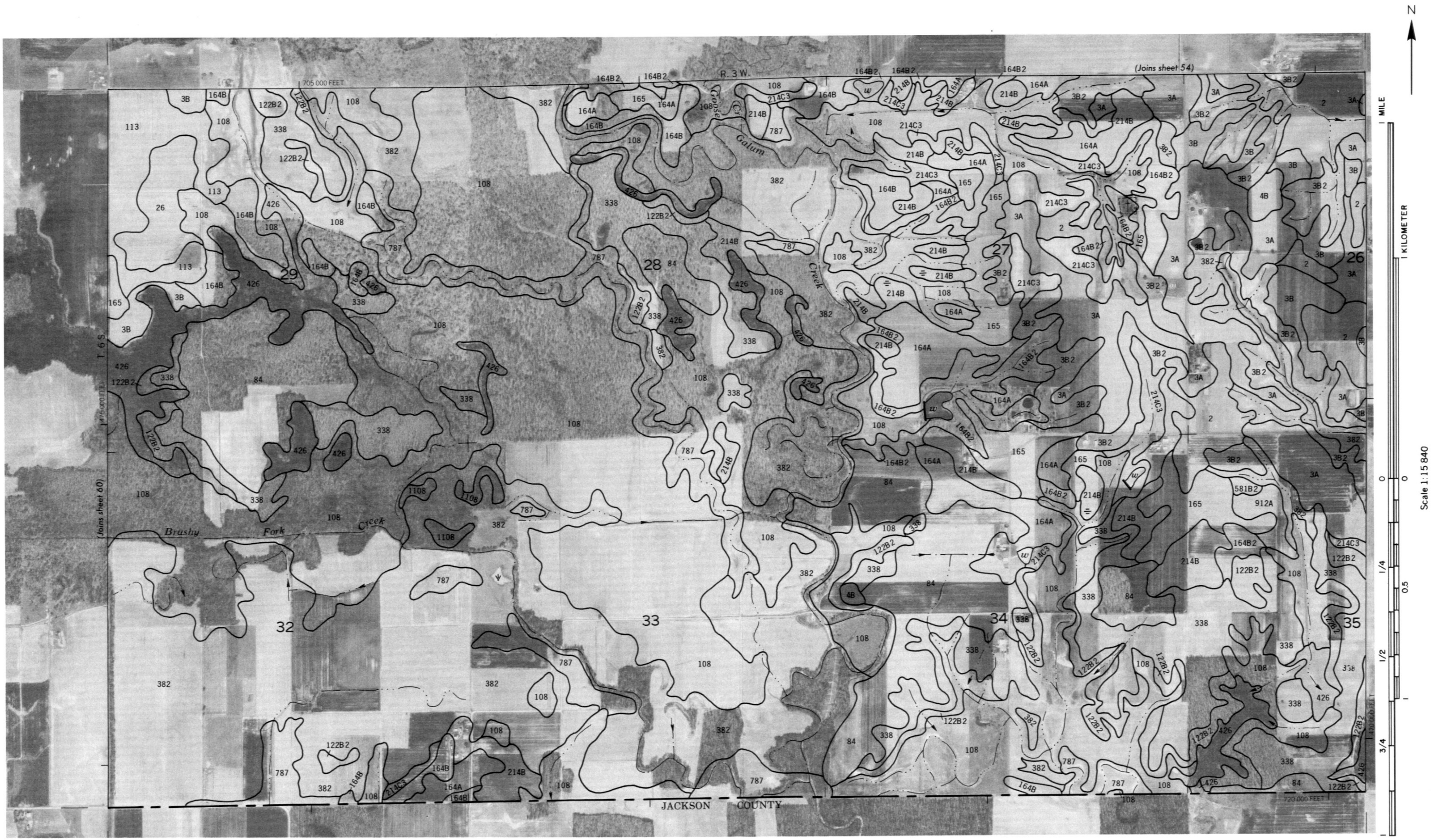

N
R. 2 W. | R. 1 W.
760 000 FEET
T. 6 S.
485 000 FEET
DUQUOIN
(Joins sheet 50)
(Joins sheet 56)
(Joins sheet 58)
(Joins sheet 64)
775 000 FEET
480 000 FEET
Sixmile Creek
Blackson Creek
13
18
17
16
24
19
20
21
871D
991
871G
5002
3A
3B
2
581B2
912B2
912A
5912
13B2
13B
13A
12
5C3
3B2
536
108
14C3
802B
871B
382
water
w
MILE
0
1/4
1/2
3/4
1
KILOMETER
0.5
Scale 1:15 840

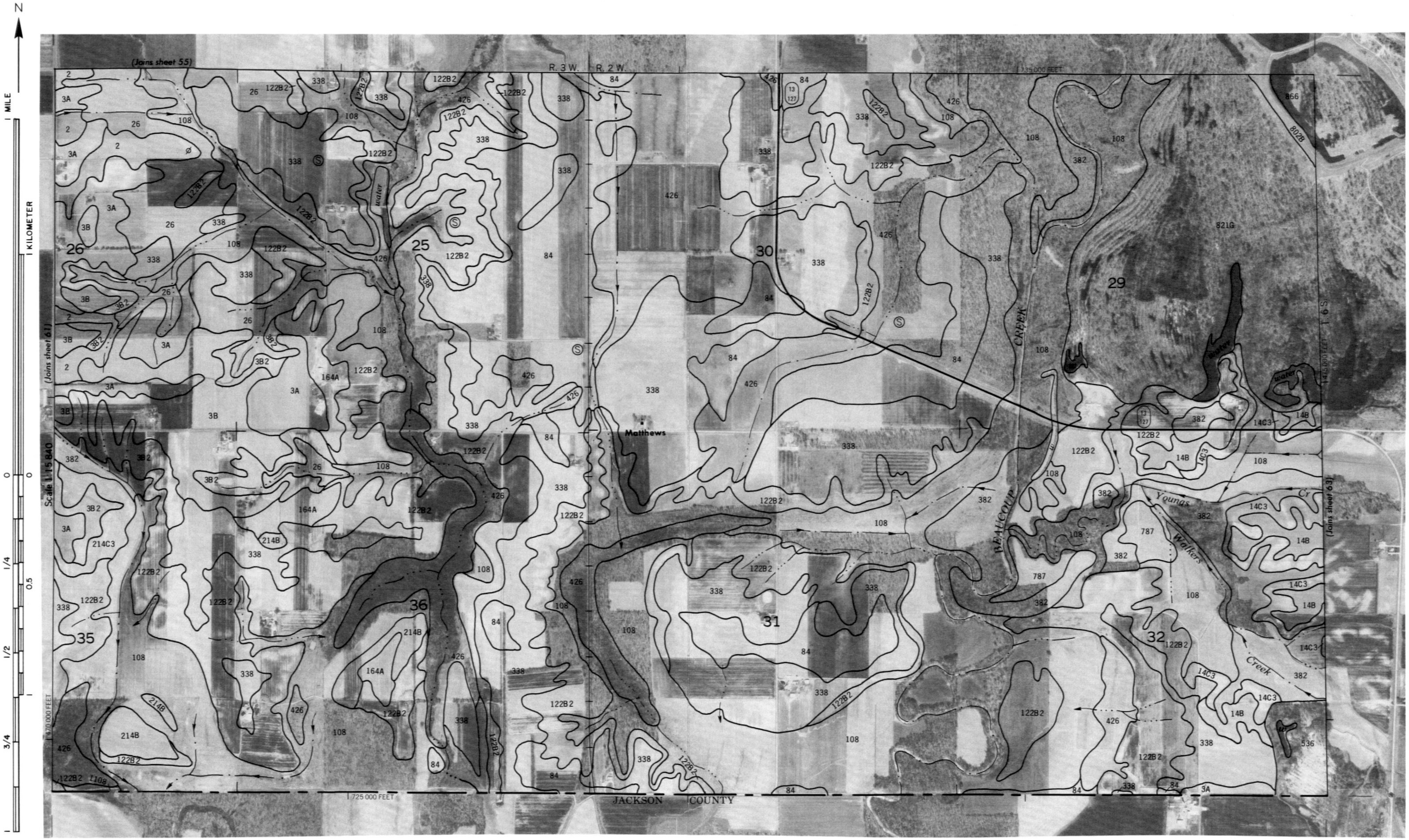

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0
0.5
1
Scale 1:15 840
(Joins sheet 51)
(Joins sheet 57)
(Joins sheet 65)
R.1 W.
R.1 E.
T. 6 S.
795 000 FEET
400 000 FEET
380 000 FEET
780 000 FEET
Reese Creek
Blacksop Creek
Blacksop
Creek
MUDDY RIVER
LITTLE
FRANKLIN COUNTY
THIRD PRINCIPAL MERIDIAN
15
14
13
18
22
23
24
19
water

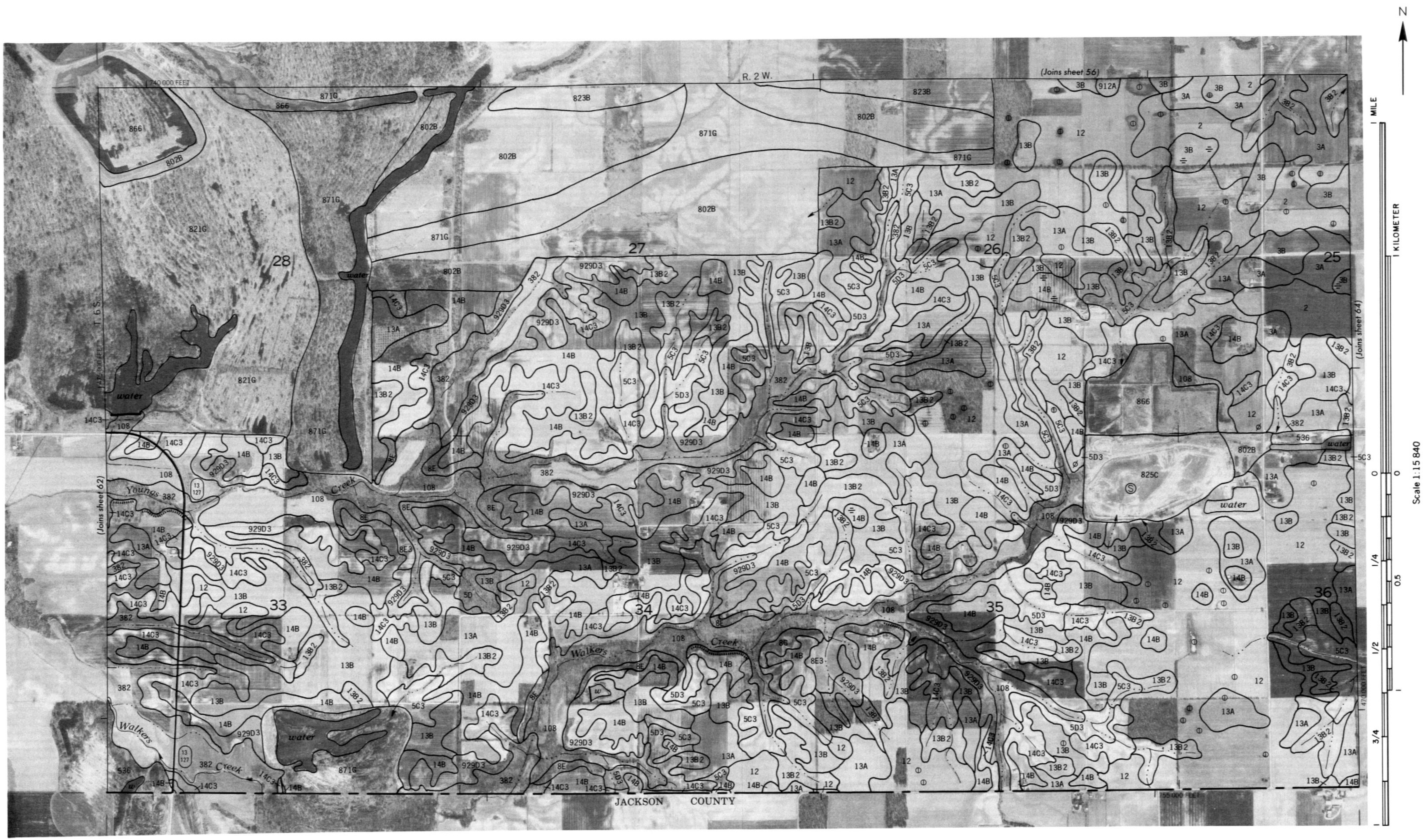
N

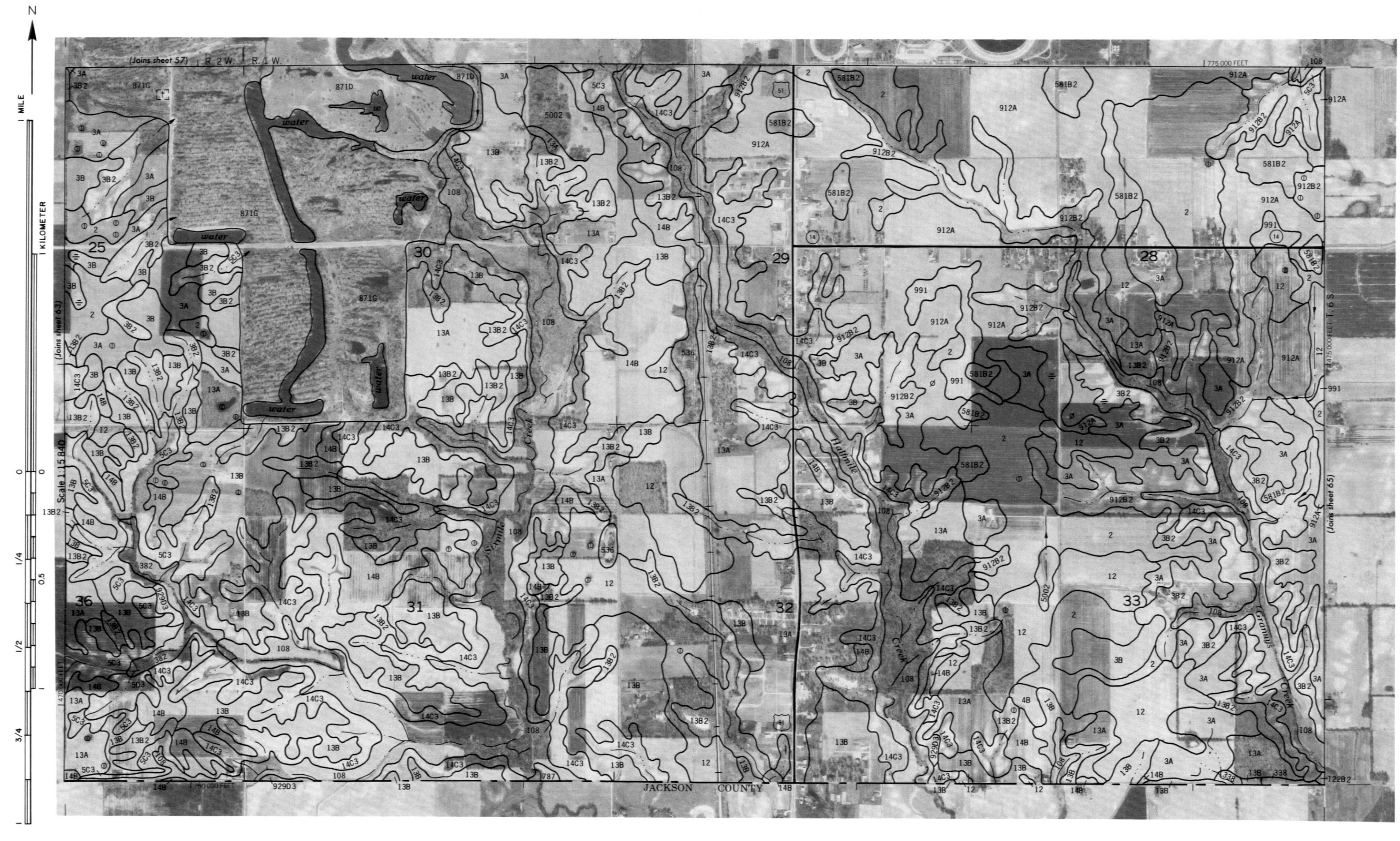
Scale 1:15 840

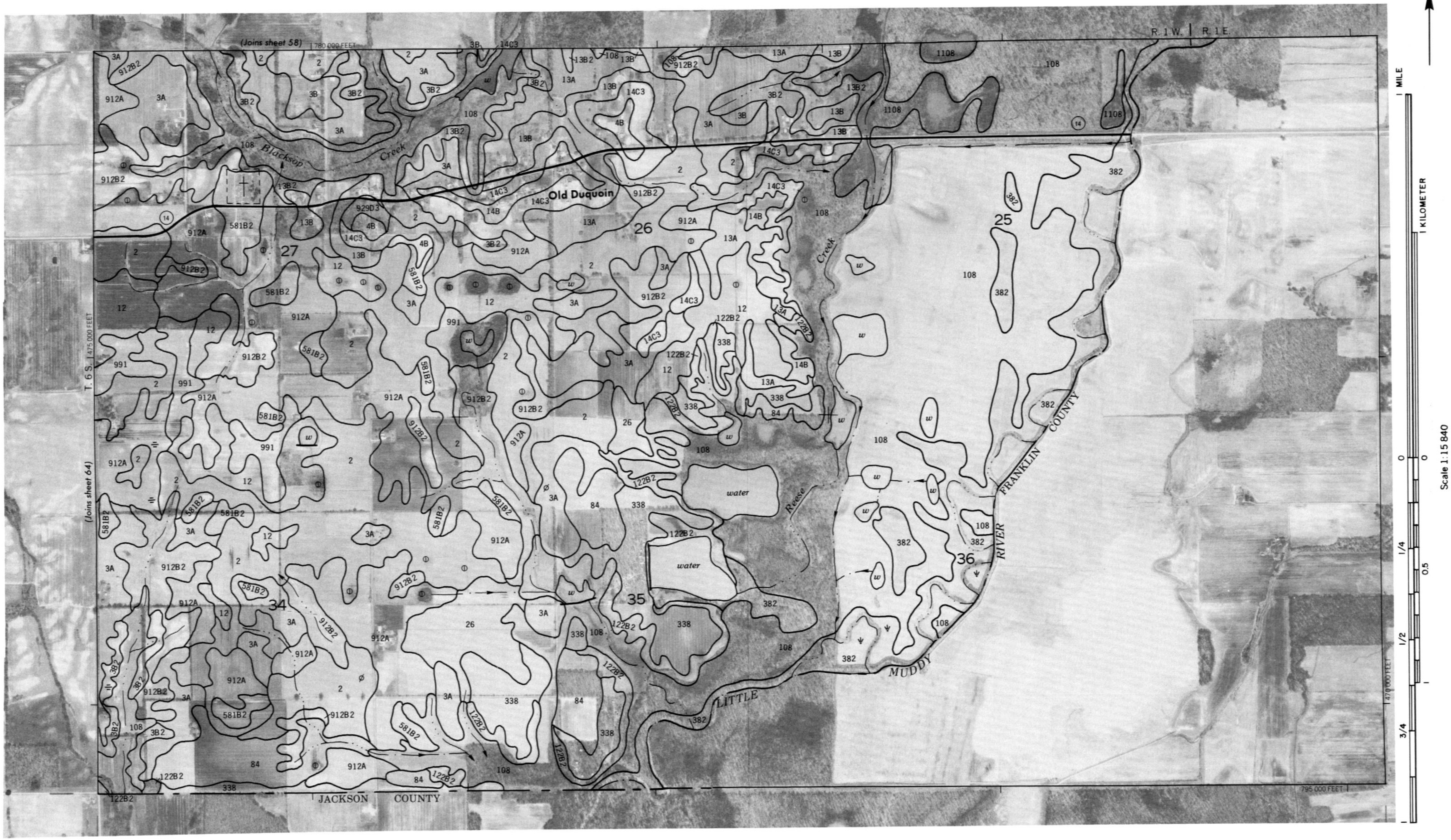

N
MILE
KILOMETER
0
1/4
1/2
3/4
1
0.5
(Joins sheet 53)
R. 4 W.
R. 3 W.
700 000 FEET
(Joins sheet 59)
(Joins sheet 61)
T. 6 S.
475 000 FEET
470 000 FEET
685 000 FEET
Scale 1:15 840
27
26
25
30
34
35
36
31
Pipestone
Creek
Brushy
Fork
Creek
JACKSON
COUNTY
water
w
2
3B
8E3
108
113
164A
164B
164B2
165
214B
214C3
382
426
787
802B
824B
850D3
866
871B
871D
871G
912B2


N
R. 3 W.
(Joins sheet 54)
705 000 FEET
T. 6 S.
(Joins sheet 60)
Brushy Fork Creek
Goose Cr
Galum Creek
29
28
27
26
32
33
34
35
JACKSON COUNTY
720 000 FEET
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
Scale 1:15 840
(Joins sheet 55)
(Joins sheet 61)
(Joins sheet 63)
R. 3 W.
R. 2 W.
T. 6 S.
735 000 FEET
725 000 FEET
Matthews
BEAUCOUP
CREEK
Youngs
Cr
Walkers
Creek
JACKSON
COUNTY
water
25
26
29
30
31
32
35
36


N
(Joins sheet 56)
R. 2 W.
740 000 FEET
T. 6 S.
(Joins sheet 62)
(Joins sheet 64)
28
27
26
25
33
34
35
36
Youngs Creek
Walkers Creek
water
JACKSON COUNTY
155 000 FEET
1 MILE
1 KILOMETER
Scale 1:15 840


N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 57)
R. 2 W.
R. 1 W.
(Joins sheet 63)
(Joins sheet 65)
T. 6 S.
JACKSON COUNTY
Halfmile Creek
Cranmus Creek
Swanwick Creek
25
28
29
30
31
32
33
36
water


N
(Joins sheet 58)
(Joins sheet 64)
R. 1 W.
R. 1 E.
T. 6 S.
Old Duquoin
Blacksop
Creek
Reese
Creek
LITTLE
MUDDY
RIVER
FRANKLIN
COUNTY
JACKSON
COUNTY
water
water
27
26
25
34
35
36
1 780 000 FEET
475 000 FEET
470 000 FEET
795 000 FEET
MILE
KILOMETER
Scale 1:15 840